DOE/EA 1806

DRAFT
ENVIRONMENTAL ASSESSMENT

FOR

THE LIBMAN COMPANY WIND ENERGY PROJECT
ARCOLA, DOUGLAS COUNTY, ILLINOIS

U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Golden Field Office

NOVEMBER 2010

DOE/EA 1806

DRAFT
ENVIRONMENTAL ASSESSMENT

FOR

THE LIBMAN COMPANY WIND ENERGY PROJECT ARCOLA, DOUGLAS COUNTY, ILLINOIS

U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Golden Field Office

NOVEMBER 2010

COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy

TITLE: *Draft Environmental Assessment: The Libman Company Wind Energy Project, Arcola, Douglas County, Illinois* (DOE/EA 1806)

CONTACT: For additional copies or more information on this draft environmental assessment (EA), please contact:

John Jediny
NEPA Document Manager
Department of Energy
Energy Efficiency and Renewable Energy
(OIBMS-EE-3C) Rm. 5H-095
1000 Independence Avenue, SW
Washington, D.C. 20585
Phone: 202-586-4790
Fax: 202-586-6551
Email: John.Jediny@ee.doe.gov

ABSTRACT: The U.S. Department of Energy (DOE) has provided a grant to the State of Illinois and is proposing to authorize the expenditure of Federal funding to design, permit, and construct the Libman Wind Energy Project, a proposed 1.5 megawatt (MW) wind turbine to be located north of the Libman manufacturing facility in Arcola, Douglas County, Illinois. DOE has already authorized the Illinois Department of Commerce and Economic Opportunity to use a percentage of Federal funding for preliminary activities, which includes preparation of this EA, conducting analysis, and agency consultation. These activities do not significantly impact the environment nor represent an irreversible or irretrievable commitment by DOE in advance of the conclusion of the EA. The proposed wind turbine would provide electricity directly to the Libman manufacturing facility, enabling it to reduce the electrical demands of the facility and lower the carbon footprint associated with daily operations. Libman has selected a Vensys 77 1.5 MW turbine for this Proposed Project. Illinois proposes to provide the project a $500,000 grant, which would come from a formula grant that Illinois received from the DOE pursuant to the State Energy Program.

This Draft EA analyzes the potential environmental impacts of the proposed construction, operation, and decommissioning of the Libman Wind Energy Project (Proposed Project) and the alternative of not implementing this project (the No-Action Alternative).

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, subject line of emails, and faxes should be labeled “Libman Wind Energy Project Draft EA Comments.” Letters should be postmarked no later than

December 17, 2010. Use of email or fax to submit comments will avoid processing delays associated with delivery of mail to Federal agencies in Washington, DC.

AVAILABILITY: This Draft EA is available for review on the DOE Golden Field Office website, http://www.eere.energy.gov/golden/Reading_Room.aspx, and the DOE NEPA web site, http://nepa.energy.gov/DOE_NEPA_documents.htm.

ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
ARRA	*American Recovery and Reinvestment Act of 2009*
BMP	Best Management Practice
CFR	*Code of Federal Regulations*
dB	decibel
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
EcoCAT	Ecological Compliance Assessment Tool
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FR	*Federal Register*
GHG	greenhouse gas
HAARGIS	Historic Architectural and Archaeology Resources Geographic Information System
IBA	Important Bird Area
IDNR	Illinois Department of Natural Resources
IDOA	Illinois Department of Agriculture
IHPA	Illinois Historic Preservation Agency
ILBBA	Illinois Breeding Bird Atlas
IPCB	Illinois Pollution Control Board
kW	kilowatt
LLC	Limited Liability Corporation
MW	megawatt
NEPA	*National Environmental Policy Act*
NHPA	*National Historic Preservation Act*
NOA	Notice of Availability
NPDES	National Pollutant Discharge Elimination System
NTIA	National Telecommunication and Information Administration
OSHA	Occupational Safety and Health Administration
SEP	State Energy Program
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
WECS	Wind Energy Conversion System

CONTENTS

Section Page

LIST OF TABLES

LIST OF FIGURES

APPENDICES

SUMMARY

The Libman Company is proposing to construct, operate, and eventually decommission a single 1.5-megawatt (MW) wind turbine along with an approximate 298 meter (980 feet) permanent gravel access road and 463 meters (1,520 feet) of underground electrical transmission lines and associated equipment at property owned by Libman Equipment, LLC to service the Libman manufacturing facility in Arcola, Douglas County, Illinois (Proposed Project). The underground line would tie in to an existing sub-station. Minor upgrades to the facility's components may be required, and all upgrades would consist of internal retrofits to an existing structure. No permanent meteorological towers would be constructed for the Proposed Project. The Proposed Project would be located on a site that is owned by Libman Equipment, LLC and that is typically used in commercial crop production. While other sites were considered, the proposed site was selected based upon a number of criteria, which are discussed in Section 2.3.3, Options Considered by Project Proponent. The approximate center point of the wind turbine would be located at latitude/longitude 39°41' 33.502, -88° 17' 50.677. The wind turbine is expected to provide renewable energy to fulfill approximately 30 percent of Libman's annual electrical demand and help to reduce greenhouse gas emissions, thereby reducing the company's carbon footprint.

The turbine model proposed for this project is the Vensys 77 1.5 MW turbine, which would be mounted on an 85 meter (279 feet) tubular steel tower. The diameter of the turbine's rotor would be 77 meters (253 feet). The turbine/tower would stand approximately 124 meters (406 feet) from the bottom of the tower to the blade tip at its highest point.

The Illinois Department of Commerce and Economic Opportunity (DCEO), which manages the Illinois State Energy Program grant, selected this project to receive a $500,000 grant from the Illinois State Energy Office. This grant would come from money that the State of Illinois received from the American Recovery and Reinvestment Act of 2009, which is administered by the DOE pursuant to the Department's State Energy Program (SEP). The purpose of the DOE's 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 SEP funds for a wide variety of activities related to energy efficiency and renewable energy. The potential use of Federal SEP funds to assist in the financing of this project constitutes a Federal action subject to review under the National Environmental Policy Act (NEPA).

When it began preparing this EA, DOE sent scoping notices to stakeholders and interested parties including local, state, and Federal agencies, and organizations to solicit comments. Notices of Public Scoping postcards were sent on July 16, 2010, directing stakeholders to DOE's Golden Field Office's Public Reading Room where DOE published the Scoping Letter for review.[1] The Scoping Letter described the Proposed Action and requested assistance in identifying potential issues that could be evaluated in the EA. The Public Comment period

[1] The July 16, 2010, Scoping Letter referred to a Proposed Project location approximately 152 meters (500 feet) north of the location analyzed within this EA. The project location was relocated for reasons described in Section 2.3.3.

closed on July 30, 2010. DOE did not receive any comments from individuals, organizations, or agencies regarding the Proposed Action.

Consistent with 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 in the Draft EA, the Proposed Project is not expected to have any measurable impacts to the following resources: wetlands, floodplains, cultural and historic resources, threatened or endangered species, avian and bat species, soils, air quality, water quality, intentional destructive acts, radio frequency transmissions, social and economic conditions, and minority or low-income populations.

DOE analyzed the impacts to the following resource areas, as described below, and discussed in further detail in the Draft EA:

Land Use – Implementation of the Proposed Project would permanently commit 0.78 acre (34,100 square feet/0.32 hectare) and temporarily disturb 2 to 3 acres (less than 130,680 square feet/1.2 hectares) of land previously used for commercial crop production or previously disturbed land owned by Libman Equipment, LLC. The area immediately surrounding the proposed turbine location and within the project boundary would continue to be available for agricultural practices.

Noise – Noise would be generated by construction equipment during the approximately five month construction period. It is estimated that sound levels (occurring only during the daytime) would exceed the guideline set by the U.S. Environmental Protection Agency (EPA) for residential day-night average noise of 55 dBA (EPA 1974) for a distance of about 2,230 feet (680 meters). The private residences closest to the proposed wind turbine site, including the nearest isolated dwellings, would all fall within this distance. Sound attenuation factors such as air absorption and ground effects from terrain and vegetation would be expected to decrease the distance at which construction noise would be 55 dBA or greater. Noise levels experienced at the residences would be similar to those of a normal office and from conversations. In addition, the sounds would be relatively short-term and would occur only during the daytime when they would be less apt to interfere with sound-sensitive activities such as sleeping. However, the wind turbine construction noise would not be expected to significantly increase ambient noise levels.

Data collected for the proposed wind turbine location indicate expected wind turbine sounds would meet applicable state and local standards; generally would be comparable to, or less than, ambient conditions; and would not be audible to most individuals. The predicted sound levels would support the area achieving EPA's objective of having Day-Night Average Sound Levels (DNL) of 55 to 65 decibels (A-weighted) dBA outdoors and a 45 dBA indoors. With the reduction between indoors and outdoors, the wind turbine's predicted sound levels would not cause indoor nighttime noise level to exceed 30 dBA, which is a sound level generally recommended for sleep.

Visual Quality – Implementation of the Proposed Project would introduce a new and dominant vertical feature in the existing viewshed. Shadow flicker is defined as alternating changes in light intensity caused by a moving object (such as a rotating rotor blade) casting shadows on another object. Nearby residential locations that could be affected the most by the phenomenon of shadow flicker could theoretically experience as many as 67 or 68 hours of flickering over the course of a year. Additional analysis factoring in area-specific meteorological conditions suggests those time periods would more likely be reduced to approximately 20 or less hours of flicker per year. Libman would not operate the turbine between the hours of 6:00 AM and 9:00 AM on days when such operation would cast shadow flicker on residences to the west of the project. This represents approximately 80 percent of all potential shadow flicker impacts that the turbine could create. Libman has committed to use a shadow impact equipment/software to control the turbine. This equipment/software would automatically shut the turbine down during these times when conditions warrant. The module would be installed with a sunlight sensor; if the sensor determines that it is a cloudy day during these impacts times, then the turbine would continue to operate as normal. Libman would also use commercially reasonable efforts to remedy any potential problems due to shadow flicker on a case-by case basis by undertaking measures such as trees or vegetation plantings, or blind or awning installations.

Human Health and Safety – Appropriate safety training, precautions, and best management practices (BMPs) would be applied during the construction, operation, and decommissioning of the turbine in an effort to either reduce or eliminate health and safety issues during these phases. DOE analyzed the potential hazards associated with turbine collapse. For this analysis, the fall zone radius was determined as the total turbine height plus 10 percent of the total height. The height of the proposed turbine is assumed to be approximately 124 meters (406 feet), therefore the fall zone radius (110 percent) is calculated to be 139 meters (456 feet). In cases of turbine collapse, the turbine would tend to buckle and therefore, fall somewhere within this analyzed area. Based on the extreme rarity of tower collapse and/or blade throw and the fact that there are no residences or public access areas located within the calculated fall zone of the turbine, adverse impacts to the public's health and safety due to potential hazards associated with turbine collapse, ice and blade throw are not anticipated as a result of the Proposed Project.

1. INTRODUCTION AND BACKGROUND

1.1 National Environmental Policy Act and Related Procedures

NEPA, the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500 to 1508), and DOE's NEPA implementing regulations (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.

In compliance with these regulations and DOE's procedures, this 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.

In compliance with these regulations, this Draft EA examines the potential environmental impacts of the DOE's Proposed Action (as defined in Section 2.1) to provide funding for the Libman Company's Proposed Project, and the No-Action Alternative. In addition to DOE's Proposed Action and No-Action Alternative, the recipient looked at project-specific options. When complete, this EA will provide DOE with the information needed to make an informed decision as to whether allowing Illinois to use some of its SEP funds for the Proposed Project may result in significant environmental impacts. Based on the final EA, DOE will either 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 environmental impact statement.

1.1 Background

The Libman Company proposes to construct, operate, and eventually decommission a single 1.5 MW wind energy project in Douglas County, Illinois. The Proposed Project site is located approximately 395 meters (1,300 feet) north of the Libman Company's manufacturing plant in Arcola, Illinois. The Proposed Project consists of a single Vensys 77 1.5 MW wind turbine, associated gravel access road, underground electrical transmission equipment, and the interconnection switchgear at the manufacturing plant. The Proposed Project area is an active agricultural field (approximately 63 acres; 25.5 hectares) located north of the plant and owned by Libman Equipment, LLC. The Proposed Project would provide electricity to the adjacent Libman manufacturing plant to reduce the required demand from existing power source(s), and to lower the carbon footprint associated with facility operations. The project proponent anticipates replacing approximately 30 percent of its annual electric usage with renewable energy generated onsite. The current estimated project cost is approximately $3.5 million. T+he Illinois Department of Commerce and Economic Opportunity (DCEO), which manages the Illinois State Energy Program grant, selected this project to receive a $500,000 grant from the State Energy Office.

States can use their SEP funds for a wide variety of activities related to energy efficiency and renewable energy. See generally 42 U.S.C. § 6321 *et* seq. and 10 CFR Part 420. In the *American Recovery and Reinvestment Act* of 2009 (Pub. L. 111-5, 123 Stat. 115; ARRA), Congress appropriated $3.1 billion to DOE's SEP, and Illinois received $101 million pursuant to a statutory formula for distributing these funds. Illinois informed DOE that it proposes to provide $500,000 of its SEP funds to the Libman Company Wind Energy Project. The potential use of Federal SEP funds to assist in the financing of this project constitutes a Federal action subject to review under NEPA.

1.2 Purpose and Need

1.2.1 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 Illinois' SEP grant to the Libman Company would partially satisfy the need of this program 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
- Create and retain jobs

ARRA enacted legislation to create jobs, restore economic growth, and strengthen America's middle class through measures that modernize the nation's infrastructure, enhance America's energy independence, expand educational opportunities, preserve and improve affordable health care, provide tax relief, and protect those in greatest need. Provision of funds under SEP would partially satisfy the needs identified under ARRA.

1.2.2 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 ARRA to reduce energy costs, reduce reliance on imported energy, reduce the impacts of energy production and energy use on the environment, and to preserve and create jobs.

1.2.3 ILLINOIS' SEP PROJECT SELECTION PROCESS

The Illinois SEP is using its ARRA 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 Office of Energy SEP program includes four sub-programs:

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

Illinois' Office of Energy issued a Request for Proposals for the SEP funded Renewable Energy Development Program. The Illinois program 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 is that funds must be fully obligated by September 30, 2010, and SEP funded projects must be fully operational by March 2012. Libman Company was one of many renewable energy grant applicants awarded SEP funds by Illinois Office of Energy in 2009. The Libman Company has been awarded $500,000. For this project, DOE is the Federal action agency, the Illinois Office of Energy is the recipient of Federal funding, and the Libman Company, who will own and operate the turbine, is the sub-recipient of this funding. The Proposed Project will be located on Libman Equipment, LLC property and will provide electricity to the Libman Company's facility.

1.3 Public and Agency Involvement

1.3.1 SCOPING SUMMARY

In accordance with the applicable regulations and policies, DOE sent scoping letters to stakeholders and interested parties including local, State, Tribal, Federal agencies, and organizations. Notices of Public Scoping postcards were sent on July 16th, 2010, directing stakeholders to DOE's Golden Field Office's Public Reading Room where DOE published the Scoping Letter for review. The Scoping Letter described the Proposed Action and requested assistance in identifying potential issues that could be evaluated in the EA. The Public Comment period closed on July 30th, 2010. In response to the scoping letters, DOE did not receive any comments from individuals, organizations, or agencies. Appendix D-11 contains a copy of the Notice of Scoping and the Stakeholder Distribution List.

The following agencies and organizations have been contacted by Libman, its representatives, and/or the DOE:

- Federal Aviation Administration
- U.S. Fish and Wildlife Service
- United States Department of Commerce – National Telecommunications and Information Agency
- Illinois Department of Natural Resources
- Illinois Historic Preservation Agency

- Arcola City Government
- Illinois Department of Commerce and Economic Opportunity
- Natural Resource Conservation Service
- Illinois Department of Agriculture
- Illinois Department of Transportation
- Douglas County Soil and Water Conservation District
- Douglas County Department of Transportation

While no Federally or state recognized tribes exist in Illinois, tribes with an historical association with the region were notified of the Proposed Project and asked to provide their comments during the public scoping process. For a list of tribes notified see the Stakeholder Distribution List (Appendix D-11).

Pursuant to Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act, the U.S. Fish and Wildlife Service (USFWS) and the Illinois Historic Preservation Agency were each provided a letter describing the Proposed Project and requesting information regarding Federally-listed species and known historic or cultural resources in the area, respectively, that may be affected through implementation of the Proposed Project. Copies of agency correspondence are included in Appendix C.

1.3.2 CITY OF ARCOLA, ILLINOIS

Libman has been in consultation with the City of Arcola concerning the Libman Wind Energy Project (Proposed Project) since June 2010[2], as the project requires a Wind Energy Conversion System (WECS) Permit under Chapter 26 of the Arcola Municipal Code (Appendix D-6). Opportunities for public involvement have occurred over the past six months in an effort to educate the public about this project and provide opportunities for public input. As part of the Arcola City Council's August 2, 2010 regular meeting, the Council considered scheduling a public hearing for the Proposed Project. The public was given the opportunity to speak on the topic and a number of residents expressed concern about the proposed turbine's location. Subsequent activities that have engaged the public include:

- On August 19, 2010, the City of Arcola City Council held a public informational meeting to learn about and consider the Libman Wind Energy Project permit application. The City Council is the hearing body and the decisional body for Wind Energy Conversion System (wind turbine) applications. Libman presented project details to the Council and the public was afforded the opportunity to comment. Numerous residents expressed concerns regarding the project location, and the potential impacts from noise, shadow flicker, and potential impacts on property values. The Council did not make a final recommendation on the project at the close of the meeting. This informational session preceded the November 10, 15 and 17, 2010, public hearings described below.

- On August 24, 2010, Libman established a web site, www.Libmanwind.com, to make information regarding the Proposed Project readily available to the public.

[2] Libman consultations with the City of Arcola date back to February 2010 when the City was soliciting input on a Wind Energy Conversion System Ordinance that had not yet been adopted. The City was engaging parties that had expressed interest in bringing wind energy projects to Arcola.

- In late August and early September, the Libman Company attempted to negotiate the lease or purchase of land further north of the proposed turbine location to address concerns expressed by local residents. As discussed in Section 2.3.3 – Options Considered by the Project Proponent, satisfactory terms for sale/lease could not be reached and this alternative was not pursued further.

- On October 16, 2010, a bus trip to Geneseo and Manlius, IL was coordinated to observe operating wind projects with one or two turbines adjacent to existing Illinois communities. The trip was co-sponsored by the City of Arcola and the Libman Company to give citizens a chance to experience first-hand being in close proximity to a large wind turbine. An article promoting the trip ran in the Arcola Record Herald on September 30, 2010 (Attachment D-18). There were 5 participants for the tour: 3 residents, the City Manager, and one Libman employee. At each location, participants received a tour by a project representative, and also had the opportunity to ask questions.

- On October 28, 2010, the City of Arcola advertised in the Arcola Record-Herald its intent to hold City Council meetings on the Proposed Project on November 10 and 11, 2010 (Appendix D-16). On November 5th and 9th, 2010, Libman representatives distributed informational letters to residents of the communities closest to the Proposed Project area (Appendix D-17) informing residents of the November hearings. The letters also provided details on the project, and invited residents to contact the Libman representatives with questions or concerns.

- On November 10, 15, and 17, 2010, the City of Arcola City Council held a public hearing at the Arcola Center (107 West Main Street, Arcola, IL) to consider the approval or disapproval of the Libman Company's proposed WECS application in accordance with the city's WECS Ordinance. Approximately 100 members of the public attended the initial hearing on November 10th. The hearing was conducted over three days to permit ample time for Libman to present its application, while also allowing for any project opponents or proponents to question witnesses. DOE representatives attended the November 10 hearing to observe the proceedings. Throughout the series of meetings Libman presented a number of witnesses (i.e., project engineer, electrical engineer, civil engineer, foundation engineer), all of whom were subjected to cross-examination by members of the public, as well as by an attorney representing owners of the approximately 80-acre property immediately north of the parcel on which the proposed turbine would be sited, the north side of E 300 North Road. Concerns expressed by residents, attendees, and counsel included:

    - shadow flicker
    - ambient and modeled noise
    - infrasound
    - turbine height
    - location alternatives
    - turbine repairs
    - road impacts
    - solvency of the project proponents and insurance aspects of the project

- airspace
- economics as they pertain to both Libman and city residents (i.e., property values)

During the November 17th hearing, Libman distributed a proposed draft ordinance prepared by its legal team (Appendix D-19). Libman incorporated a total of 27 conditions into the draft ordinance. Key conditions addressed: height, residential setback, communications interference, construction schedule with timing limitations, dust control, decommissioning, noise regulations, tower lighting, underground d transmission, and establishment of a 24-hour "complaint hot line". An additional condition proffered by Libman, and also submitted as an Operations Supplement, was the commitment to not operate the turbine between the hours of 6:00 AM and 9:00 AM on days when such operation would cast shadow flicker on residences to the west of the project. Further details are provided in Sections 2.5 Project Proponent Committed Measures, and 3.2.2.2 Visual Quality.

The City Council concluded that it would convene on November 30, 2010 to deliberate the merits of the proposed WECS application. At the City Council's December 6, 2010 meeting a final vote on the project is expected.

1.3.3 DRAFT ENVIRONMENTAL ASSESSMENT

This Draft EA was posted on November 30, 2010 and is open for public comment for 17 days. A Notice of Availability (NOA) with public comment procedures for the EA was made available via postcards and references the public's opportunity to comment on the Proposed Project's potential impacts on the environmental, social and economic resources. The NOA was sent to potential stakeholders and interested parties, including Federal, State, Tribal, local agencies, and approximately 180 residents located in the immediate vicinity of the Proposed Project. Additionally, DOE is conducting its Section 106 Consultation under the *National Historic Preservation Act of 1966* (NHPA) concurrent with its NEPA evaluation for this Proposed Project. The public will be afforded the opportunity to comment on historic resources via the same method for commenting on the EA. All comments related to historic resources received will be provided to the Illinois State Historic Preservation Office, as will DOE responses. The NOA will be published in the Arcola Record-Herald and the Springfield State Journal-Register. The NOA will also be posted to the City of Arcola web site (http://www.arcolaillinois.org) and the Libman Wind Energy web site (www.Libmanwind.com). Hard copies of the Draft EA will be made available in the Arcola Public Library, 407 East Main Street, for the duration of the public comment period. The EA has been posted on the DOE Golden Field Office Reading Room website (http://www.eere.energy.gov/golden/Reading_Room.aspx) and at the DOE NEPA web site (http://nepa.energy.gov). Stakeholders and interested parties will be afforded the opportunity to comment on-line via email or via written correspondence to the postal address provided therein. At the conclusion of the 17 day comment period (December 17, 2010), DOE will analyze and consider all submitted comments and questions.

Comments and questions that are repetitive or similar in nature will be grouped under one issue heading. Each of these issues will be considered for inclusion in the final EA. After consideration and analysis, responses are written and posted on the website. Commentors who include contact information will receive a copy (digital or written) of the response to their issue.

After completion of the final EA, DOE will determine whether to issue a FONSI or prepare an environmental impact statement.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 DOE's Proposed Action

DOE is proposing to authorize the expenditure of Federal funding to design, permit, and construct the Libman Wind Energy Project (Proposed Project), a proposed 1.5 MW wind turbine to be located north of the Libman manufacturing facility in Arcola, Douglas County, Illinois.

DOE has already authorized DCEO to use a percentage of Federal funding for preliminary activities, including the preparation of this EA and associated analyses. These preliminary activities do not significantly impact the environment nor represent an irreversible or irretrievable commitment by the DOE in advance of the conclusion of the EA for the Proposed Project.

2.1 Illinois' Proposed Project

The DCEO, which manages the Illinois State Energy Program grant, selected Libman to receive a $500,000 grant based on several criteria including: project readiness; matching capabilities, financing, and cost effectiveness; economic impact for Illinois; project characteristics and potential for innovation. This selection process also evaluated the project's ability to provide emission-free energy; and to create jobs during construction of the project.

The project would involve the construction, operation, and eventual decommissioning of a single 1.5 MW wind turbine along with an approximately 298 meter (980 feet) permanent gravel access road and a 463 meter (1,520 feet) underground electrical transmission line (Figure 2-2 below, and Appendix A – Figure 1 -2). The proposed underground electrical transmission line would extend from the proposed turbine location southward to the existing switchgear associated with the existing Libman manufacturing facility. The proposed wind turbine would enable Libman to reduce electrical demands from their existing electrical service provider and lower its carbon footprint.

2.1.1 PROJECT LOCATION

The Proposed Project would be located on a 63-acre (25.5 hectares) active agricultural plot that is located immediately north of the existing Libman Company manufacturing site in Arcola, Illinois (Douglas County) (Figure 2-1). The legal description of the Proposed Project location is Township 14 North, Range 8 East, Section 3. The approximate latitude/longitude for the proposed wind turbine is 39°41' 33.502, -88° 17' 50.677.

The existing Libman manufacturing facility is located 395 meters (1,300 feet) due south/southwest of the project location. A single-family residential housing development is located approximately 411 meters (1,350 feet) to the west/southwest of the project location. Single-family homes associated with larger agricultural lots are located approximately 350 meters (1,148 feet) to the northeast, 540 meters (1,770 feet) to the northwest, and 586 meters (1,900 feet) to the southeast of the project location. Another single-family residential development immediately east of the Libman manufacturing facility is located approximately

515 meters (1,690 feet) south/southeast of the project location. Interstate 57 is located approximately 457 meters (1,500 feet) due east of the project location. Construction of a new single-family residence is underway on the north side of E 300 North Road, approximately 342 meters (1,120 feet) north/northwest of the project area. Land use and the features described above can be seen in Figure 3-1, an aerial image of the project area.

The proposed location of the wind turbine and the layout of the proposed gravel access road and underground electrical lines are indicated on Figure 2-2.

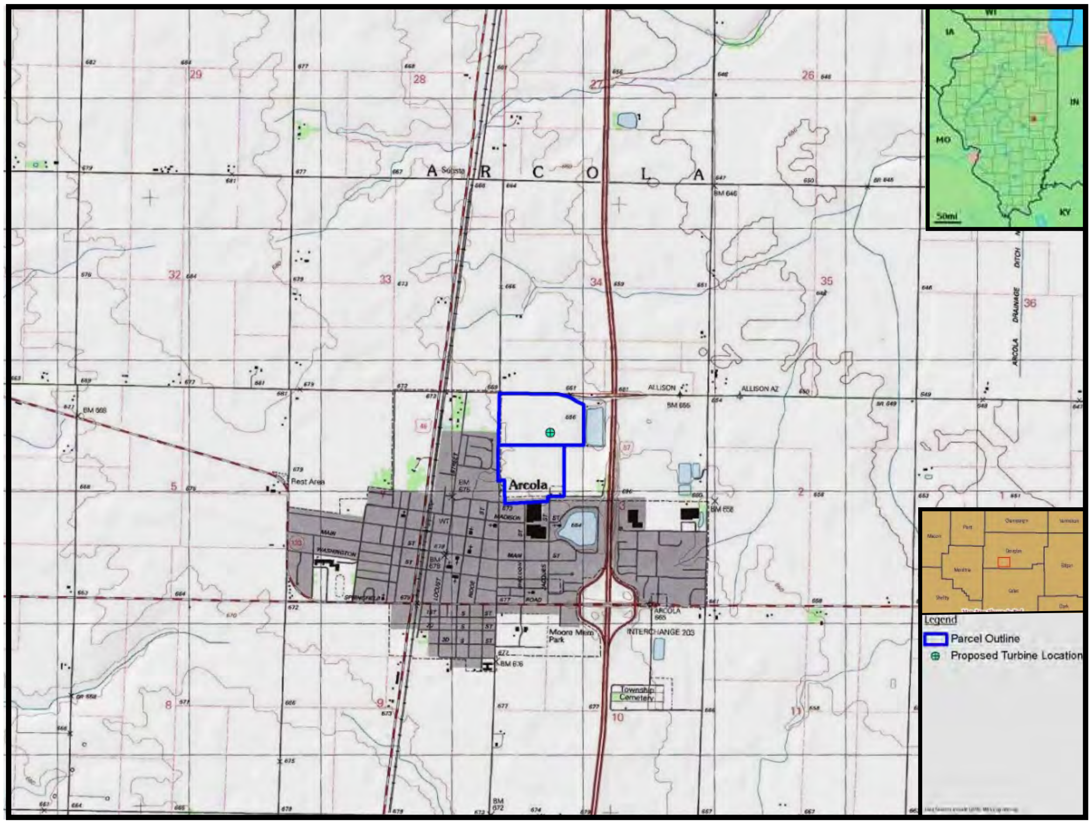


Figure 2-1. Project Location

2.1.1.1 Construction and Installation

Site construction would include installation of a single wind turbine, underground electrical distribution line, access road, crane pad, and foundation system. The construction would be carried out in accordance with an approved National Pollution Discharge Elimination System (NPDES) Permit, Stormwater Pollution Prevention Plan, and in compliance with all other applicable requirements and regulations. Turbine delivery is assessed under Section 3.2.2.8-Transportation.

The proposed 463 meter (1,520-foot) underground electrical distribution line would connect the turbine to the existing electrical switchgear associated with the Libman manufacturing facility. To establish effective electrical distribution to the Libman manufacturing facility, the following equipment and components may be installed:

- fiber optic cable
- 250KCMIL wire
- #2/0 ground wire
- 12470 volt switchgear on a concrete housekeeping pad
- bus duct to interconnect with Libman's existing switchgear
- production meter

New electrical metering equipment would also be installed within existing infrastructure to allow for net metering. On nights and weekends when plant usage is lower, and at times when it is windy and turbine output exceeds the facility's load, the utility local utility company can separately track and pay to purchase the excess electricity at the wholesale electric rate. The transformer and switch gear cubicle would be situated outside the wind turbine tower at foundation level. The low voltage side of the transformer would be connected to a distribution panel at the tower's base inside the tower, by cable connection leading through the foundation of the turbine. The unit substation (transformer and switch gear cubicle) would be provided by the manufacturer.

During construction of the proposed turbine, the crane pad would be located approximately 18 to 24 meters (60 to 80 feet) away from turbine's foundation base. An approximate 298 meter (980 feet) gravel access road would be constructed from E. 300 North Road to the turbine location (Figure 2-2). Libman would install warning signs indicating all high voltage areas around the turbine foundation.

Based on a variety of geotechnical conditions, bearing capacity of the soils, depth and quality of bedrock, and other factors, a variety of foundation design approaches can be used for this project. In most instances, a "spread foot foundation" (steel-reinforced concrete footer) has proven to be safe, appropriate, and effective for wind turbine installations similar to this Proposed Project.

Short-term surface disturbance during construction is anticipated, during the preparation of the tower facilities, associated access road, and underground electrical distribution trench. Construction would be performed in accordance with an approved erosion and sedimentation control plan and in compliance with all other applicable requirements. With current expectation for surface disturbance being approximately 2-3 acres, an NPDES permit would be required by the Illinois Environmental Protection Agency, as the disturbance threshold for this permit is 1 acre. Construction activities for the wind turbine foundation, tower erection, turbine nacelle placement, and blade installation are highly contingent on temperature and weather conditions. Turbine nacelle and blade installations would be installed during calm wind periods. Foundations would not be installed during cold winter months. These external factors are highly influential on the construction and installation schedule and would influence the final construction timeline.

The wind turbine construction, including site preparation, erection, and final commissioning, generator installation, and overall systems tie-in and start-up is estimated to take at least five months. The Proposed Project schedule is subject to variables and contingencies related to timely document and permit preparation and approvals. Variations in these timeframes would result in adjustments to this initial schedule. During this five month period, the site would be expected to see activity for approximately 3 months. In the two months at the beginning of the five month period, excavation, electrical underground cable trenching and foundation work would take place, and in the one month at the end of the five month period, final electrical work, tower erection, turbine and blade installation, and startup would occur.

The following breakdown is anticipated for the construction periods:

- Excavation - 2 weeks,
- Foundation and reinforcing Work - 8 weeks,
- Electrical distribution (including fiber optic and power cable laid in trench, switchgear installation at existing switchgear room, etc.) - 2 weeks,
- Tower erection - 2 days,
- Turbine nacelle and blade installation - 1 week,
- Electrical tie-in and interconnection - 2 weeks,
- Turbine and system commissioning - 2 weeks,
- Site cleanup and recreation facility restoration - 1 week.

The construction phase would also include occupying areas of the adjacent Libman manufacturing facility to serve as lay down areas for machinery, equipment, and supplies. During construction, the project area would be closed and secured to prevent public access to the work zone. Areas experiencing temporary disturbance due to construction activities would be restored to pre-construction conditions.

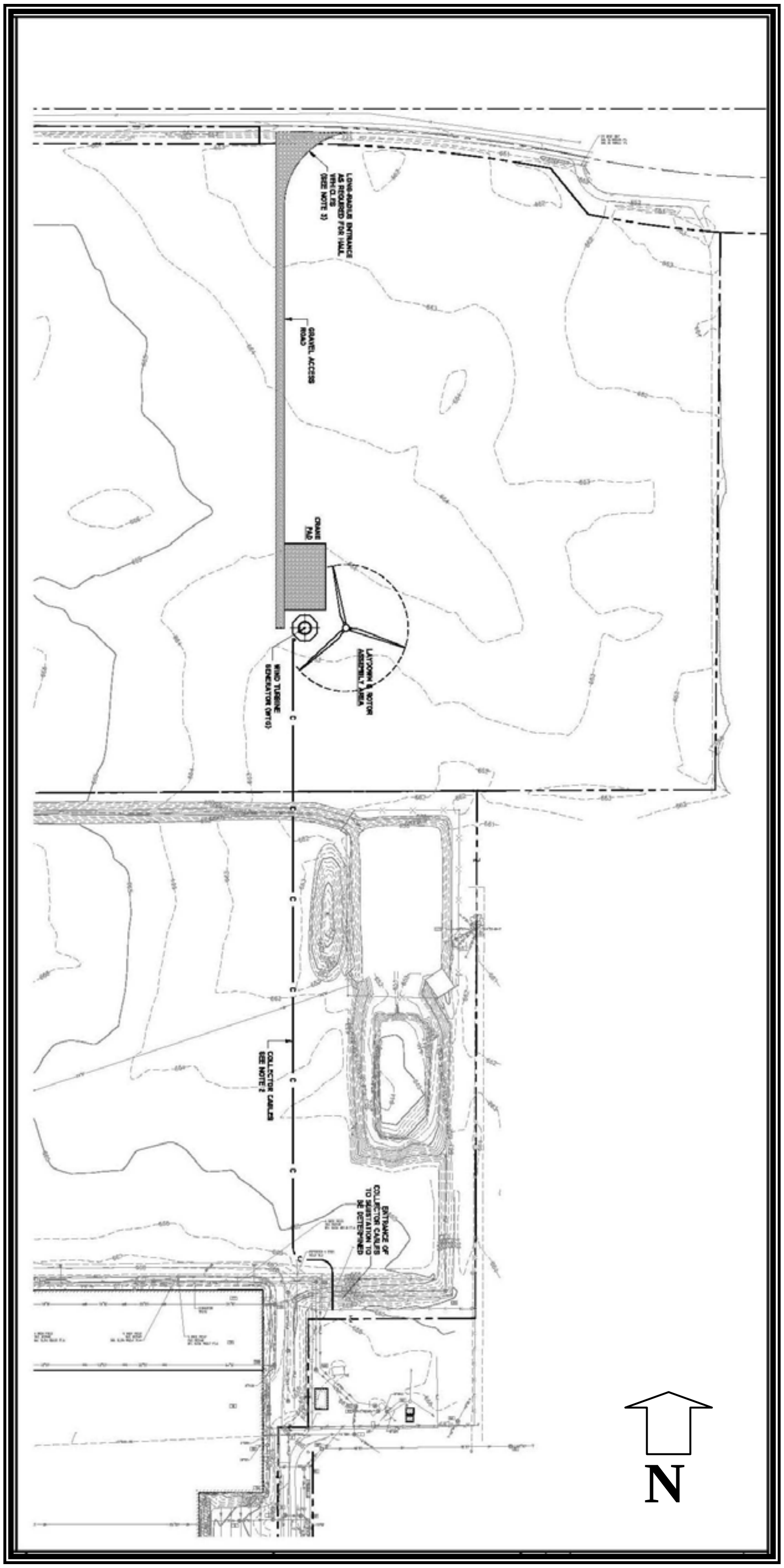


Figure 2-2. Project Layout (Figure with scale and legend is included in as Figure 2 in Appendix A)

Aviation Lighting

Lighting for aviation safety would be installed to comply with Federal Aviation Administration (FAA) requirements (FAA, 2007). Red flashing lights operating only at night time would be used at the minimum number, minimum intensity, and minimum number of flashes per minute allowable by the FAA.

2.1.1.2 Operations and Maintenance

Libman would operate and maintain the wind turbine according to standard industry procedures and applicable requirements. All workers associated with turbine maintenance and operation would be properly trained and informed about wind facility safety. Routine maintenance of the turbine would be necessary to maximize performance and identify potential problems or maintenance issues. The turbine would be monitored through the use of a to-be-installed Supervisory Control and Data Acquisition system to ensure that operations are proceeding efficiently. Any problems would be reported electronically to operations and maintenance personnel, who would perform both routine maintenance and most major repairs. Most servicing would be performed up-tower by a maintenance crew who would not need to use a crane to remove the turbine from the tower. In addition, all roads, pads and trenched areas would be regularly inspected and maintained to minimize erosion.

2.1.1.3 Decommissioning

The turbine and other infrastructure are expected to have a useful service life of at least 20 years. Upon reaching the expected operational life of the wind turbine, Libman anticipates retooling the generator and additional parts in an effort to continue its operation until the entire turbine needs to be replaced. At that time, Libman would determine if the turbine would be replaced based on current day technologies. However, if Libman does not retool the turbine, activities associated with the decommissioning of the project are expected to be similar in nature.

Activities associated with the decommissioning of the project are expected to be similar in nature to the initial construction when the project is terminated. If an upgrade is not considered, the turbine and other infrastructure would be decommissioned, and all facilities would be removed to a depth of approximately 3 feet below grade. The surface soil would be restored as close as possible to its original condition. Underground facilities would either be removed or safely secured and left in place. Salvageable items (including fluids) would be sold, reused, or recycled as appropriate; unsalvageable material would be disposed of at authorized sites. Reclamation procedures would be based on site-specific requirements commonly employed at the time the area is to be reclaimed and could include re-grading and adding topsoil to facilitate a return to agricultural use. All decommissioning activities would be performed in accordance with the selected manufacturer’s guidelines, the decommissioning plan, as well as all applicable Federal, state, and local regulations. Similar activities would be evaluated during the construction phase and reevaluated during the decommissioning phase. As part of the City of Arcola’s WECS Permit review, an applicant is required to formulate a decommissioning plan. The Libman decommissioning plan is provided as Appendix D-13.

2.2 Alternatives

2.2.1 DOE ALTERNATIVES

Illinois' ARRA SEP funds are from a formula grant, the amount is established pursuant to a formula from DOE's SEP grant procedures at 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 as set forth by law and by SEP guidelines.

DOE's alternatives to its Proposed Action relating to Illinois' use of its SEP funds are limited to: (1) any options still being considered for the proposed project by the recipient; and (2) prohibiting Illinois and Libman from using Federal funding for the Proposed Project. The second alternative is the equivalent to the No-Action Alternative as described in Section 2.3.2. Illinois and Libman have informed DOE that there are no "project-specific" options being considered for the proposed project. Additionally, there are no unresolved conflicts concerning alternative uses of available resources associated with the project site that would suggest the need for other alternatives.

2.2.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, DOE would not allow Illinois to use its SEP funds for the Proposed Project. DOE assumes, for purposes of this Draft EA, that the project would not proceed without SEP funding. Using 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, Libman operations would continue as otherwise planned, but without the proposed turbine. 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 ARRA.

2.2.3 OPTIONS CONSIDERED BY THE PROJECT PROPONENT

In order to meet the goals of a reduced carbon footprint and energy cost savings, Libman considered the following renewable energy alternatives:

- Photovoltaic solar array
- Multiple smaller capacity wind turbines
- Single 2.5 MW wind turbine
- Alternative locations for the proposed wind turbine
- The use of a 62-meter (203-foot) and/or a 100-meter (328-foot) tower in lieu of the proposed 85-meter (279-foot) tower

Solar energy production was not considered viable based on implementation costs exceeding expected energy savings benefits and the expected diminished efficiency of this technology at this location compared to wind energy production.

Libman also conducted an analysis considering the use of multiple smaller wind turbines at the proposed site. The use of the less efficient turbines proved not to be cost effective and installation and operation costs were more than the expected energy savings benefits. One option was the construction and operation of three 600 kilowatt (kW) turbines (Appendix D-3b). However, evaluation of the land available for this project and the setback requirements for the 290-foot towers for these turbines indicated there was not sufficient land on the available parcel to accommodate the setback requirements and spacing for this arrangement.

Libman also considered installing a single 2.5MW turbine. However, for a number of reasons such as product availability, manufacturer willingness to provide a single large turbine, and product history in Illinois, Libman ultimately settled on a smaller Vensys 77 1.5 MW turbine. Additionally, in 2007, Illinois adopted a new “net metering” law allowing renewable energy electricity generators of up to 2 MW in size to be connected to the grid and receive full replacement value for all electricity they generate and which is used by the customer (DSIRE, 2010).

Siting options for the single turbine project were evaluated for three locations within currently owned Libman parcels north of the Libman manufacturing facility, and another nearby privately-owned parcel further north (Figure 2-3). The cost of acquiring adequate land within the nearby privately-owned parcel (Alternative C on Figure 2-3) proved to be cost prohibitive and therefore this parcel was removed from additional consideration. Siting options within the Libman-owned parcel considered City of Arcola property set-back requirements, health and safety factors, and environmental factors including shadow flicker and noise impacts. The final proposed location evaluated in this EA (“Current Location” in Figure 2-3), adheres to all of the required set-back requirements and is located to minimize, to the greatest extent possible, the potential for shadow flicker and noise impacts.

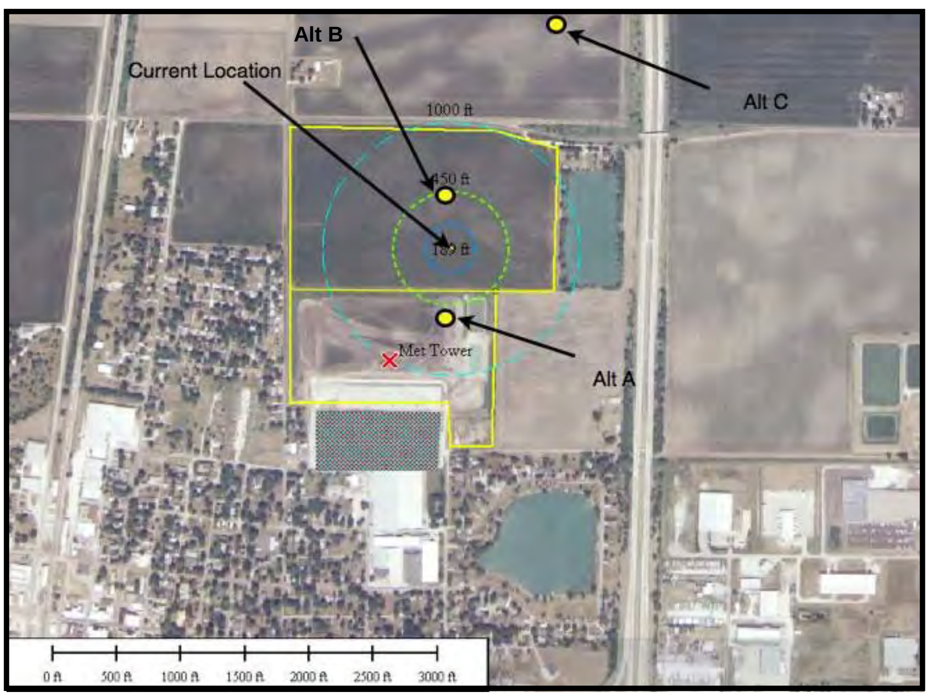


Figure 2-3. Wind Energy Alternatives Evaluated

The selection of the proposed turbine's tower was determined by comparing the initial cost of purchasing and constructing the tower to the wind resources at the site at various heights. The table below indicates that the average wind speeds increase with height. Based on the Libman Proforma (Appendix D-20) prepared for the Libman Company, the cost and benefits of three possible turbine heights were considered: a 100-meter (328-foot) tower, an 85-meter (262-foot) tower, and a 62m (203-foot) tower. On a simple comparison of cost per kWh/yr based on total project cost, the 85m tower height offered the lowest cost at $0.87/kWh/yr, a significant cost savings over the 62m tower at $1.06/kWh/yr. Whereas the 100m tower offered a cost of $0.89/kWh/yr, based on the additional $406,000 cost for the 100-meter tower, the actual cost per additional kWh/year of energy production for the 100-meter tower when compared with the 85-meter tower was $1.10. Therefore, after weighing the energy generated and associated unit cost associated with the various tower heights, Libman determined that the 85m tower was the most financially prudent option. Table 2-1 below presents the above information in tabular form.

Table 2-1. Libman Proforma Comparison

	62m	85m	100m
Calculated Mean Net Energy Output (kWh/yr)*	3,022,200	4,033,980	4,401,900
% Increase in kWh/yr Over Smaller Tower	X	33.5%	9.1%
Total Project Cost	$3,208,000	$3,508,000	$3,914,000
Project Cost per kWh/yr	$1.06	$0.87	$0.89

	Additional kWh/yr	% Increase kWh/yr	Total Project Cost Increase	Additional Cost per extra kWh/yr
Increase Tower Height from 85m to 100m	367,920	9.1%	$406,000	$1.10

Source: Libman Proforma 62m,85m,100m (Appendix D-20)

* Calculated using Windographer - Vensys 1.5MW Turbine.

2.3 Permits, Approvals, and Notifications

Prior to construction, all required Federal, state and local permits and approvals would be obtained. The required permits, approvals and notifications are listed in Table 2-2. Documentation of all agency approvals that have been received is provided in Appendix C of this Draft EA.

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

Agency	Permit Approval/Type
Federal	
Federal Aviation Administration	FAA Aeronautical Determination (received October 18, 2010, Appendix C)
National Telecommunications and Information Administration	Radio Frequency Transmission Notification
U.S. Fish and Wildlife Service	Compliance with Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.
State	
Illinois Historic Preservation Agency	Compliance with National Historic Preservation Act of 1966 (as amended)
Illinois Environmental Protection Agency	National Pollution Discharge Elimination System, filing Notice of Intent for Construction Activities
Illinois Department of Natural Resources	17 III. Adm. Code Part 1075 and 1090. State Threatened or Endangered Species consultation and natural resources review
Illinois Department of Transportation	Oversize/Overweight Vehicle (to be obtained by the trucking/delivery company)
Local	
City of Arcola	Wind Energy Conversion System Permit

Libman must comply with the City of Arcola's WECS Ordinance (Chapter 26 of the City's Municipal Code Book) (Appendix D-6). Article I of the Ordinance lays out the requirements for wind energy conversion systems that exceed 100 kW, as in this case, and requires all such projects to obtain a Special Use Permit from the City. The Ordinance establishes criteria for the following key areas:

- Siting Approval Application
- Design and Installation
- Operation
- Noise Levels and Shadow Flicker
- Birds and other Natural Resources and Wildlife Issues
- Public Participation
- Liability Insurance and Indemnification
- Decommissioning Plan

2.4 Project Proponent-Committed Measures

Libman has committed to the following measures and procedures to minimize or avoid environmental impacts if the Proposed Project is carried forward.

2.4.1 WASTE MANAGEMENT

Waste generated during construction, operation, and eventual decommissioning of the Proposed Project, including used lubricants, would be handled, collected, transferred and reused/recycled in accordance with applicable Federal, State and local regulations.

2.4.2 WATER RESOURCES – GROUND AND SURFACE WATER

Construction would be carried out in accordance with an approved NPDES permit, Stormwater Pollution Prevention Plan, and in compliance with all other applicable requirements and regulations. The project would also follow applicable sediment and erosion pollution control Best Management Practices (BMPs).

2.4.3 VISUAL QUALITY

Libman would not operate the turbine between the hours of 6:00 AM and 9:00 AM on days when such operation would cast shadow flicker on residences to the west of the project. This represents approximately 80% of all potential shadow flicker impacts that the turbine could create. Libman committed to use a shadow impact equipment/software to control the turbine. This equipment/software would automatically shut the turbine down during these times when conditions warrant. The module would be installed with a sunlight sensor, if the sensor determines that it is a cloudy day during these impacts times, then the turbine would continue to operate as normal. Libman would also use commercially reasonable efforts to remedy any potential problems due to shadow flicker on a case-by case basis by undertaking measures such as trees or vegetation plantings, or providing blind or awning installations to impacted residents.

2.4.4 NOISE

All construction activities would occur during normal working hours to avoid noise and other disturbances to surrounding areas, and would conform to all local noise ordinances and other applicable Federal, State and local requirements.

2.4.5 CULTURAL AND HISTORIC RESOURCES

If archaeological resources are encountered during construction, ground disturbing activities would cease, and the Illinois Historic Preservation Agency (IHPA) would be contacted for resolution and further instruction regarding additional studies and/or potential mitigation measures required in accordance with the *National Historic Preservation Act*.

2.4.6 GEOLOGY AND SOILS

Libman would require its construction contractor to use BMPs during construction, operation, and decommissioning to protect topsoil and to minimize soil erosion. BMPs would include at a minimum: containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material and re-vegetating disturbed areas with native species. Construction would be carried out in accordance with an approved NPDES permit, Stormwater Pollution Prevention Plan, and in compliance with all other applicable requirements and regulations.

2.4.7 BIOLOGICAL RESOURCES

During turbine siting, Libman has given consideration to the guidelines contained within the *Interim Guidelines to Avoid and Minimize Wildlife Impacts* (USFWS 2003). The following measures are part of the Proposed Project and would be implemented to reduce potential impact to avian and bat species:

- Electrical distribution line would be installed underground.
- Ground lighting would be limited to the immediate vicinity of the turbine tower base and lighting fixtures would be used that reduce the potential to attract songbirds and other bird species migrating at night.
- The turbine would be a monopole design. Lattice towers, which have become roosting sites for birds at other wind projects, would not be used to support the wind turbine.
- Ground guy wires would not be used for support of the wind turbine. Guy wires are often difficult for birds and bats to detect, and can be the source of collision injuries and death.

Libman has also reviewed and will incorporate several of the BMPs from the USFWS Wind Turbine Guidelines Advisory Committee’s Site Development and Construction BMPs (March, 4, 2010). Discussion of the applicable recommendations and actions are located within the “Direct and Indirect Impacts” within Section 3.2.2.6- Biological Resources.

2.4.8 HUMAN HEALTH AND SAFETY

The construction contractor and facility operator would prepare a Health and Safety Plan before beginning work, according to the Occupational Safety and Health Administration (OSHA) requirements. The construction of the proposed wind energy project would comply with all applicable Federal, state and local requirements.

The proposed turbine 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.

Safety signage would be posted around the tower (where necessary); transformers and other high-voltage facilities would be in conformance with applicable Federal and state regulations. The turbine system would have an automated sensor for interior nacelle temperature and shut off when it’s too high, such as in the event of a fire.

2.4.9 TRANSPORTATION

Libman has committed to repair any roads or other infrastructure damaged by transporting materials and/or equipment during construction, operation, and decommissioning in accordance with a City Roads Agreement which would be approved by each Township and County traversed from an Interstate to the Proposed Project location.

2.4.10 AIR QUALITY

Temporary dust generated during construction and decommissioning would be minimized to the extent practicable (for example, by keeping gravel on roads and watering dry unpaved roads).

2.4.11 UTILITIES AND ENERGY

While impacts to the electromagnetic communication links (i.e., radio, microwave, radar) are not anticipated, should a Federal agency or private entity identify concerns with the Proposed Project, Libman would work directly with the party to address those concerns.

2.4.12 OPERATION AND MAINTENANCE

Operation and maintenance procedures are specific to the model and type of turbine selected for this project. Libman would maintain the turbine to manufacturer specifications while incorporating BMPs. All workers would be properly trained for turbine maintenance and safety. Routine maintenance of the turbine would be necessary to maximize performance and identify potential problems or maintenance issues. The turbine would be monitored to ensure operations are proceeding efficiently. Any problems would be reported to Libman operations and maintenance personnel, who would perform all routine maintenance. Major repairs are anticipated to be completed by the manufacture or the manufactures representative. Most servicing would be performed up-tower by a maintenance crew who would not need to use a crane to remove the turbine from the tower.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This chapter of the Draft EA examines in detail the potential environmental impacts of the Proposed Project and the No-Action Alternative for the following affected environmental resource areas: Land Use, Visual Quality, Noise, Cultural and Historic Resources, Geology and Soil, Biological Resources, Human Health and Safety, Socioeconomics, Environmental Justice, Transportation, Air Quality, and Utilities and Energy.

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 Proposed Project; therefore there would not be any impacts to the resource areas analyzed in this Draft EA. However, without the Proposed Project, Libman would continue purchasing energy from Ameren Energy. If the Proposed Project is not implemented, approximately 30 percent of Libman's average annual electrical power that could be provided by the project would continue to be purchased. Ameren Energy generates electricity and also purchases electricity from other utilities. Fuel sources for this energy include coal (85 percent), nuclear (13 percent), natural gas (1 percent), hydroelectric (less than 1 percent), and oil (less than 1 percent). Therefore, fossil fuels represent the vast majority of the fuel sources used to provide electricity to the Libman facility. Thus, carbon dioxide emissions from electricity generation to serve the Libman facility would be higher remain the same under the No-Action Alternative, and Libman would not meet its objective to reduce its carbon footprint.

Additionally, the jobs created and retained 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.

3.2 Illinois' Proposed Project

3.2.1 CONSIDERATIONS NOT CARRIED FORWARD FOR FURTHER ANALYSIS

Consistent with 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 the description and analyses of these resources are not carried forward for further analysis.

3.2.1.1 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 proposed turbine would be minimal. Solid wastes anticipated to be generated during decommissioning include dismantled equipment and construction related material debris. Hazardous and regulated non-hazardous 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. Used oil (e.g., spent gear box oil, hydraulic fluid, and gear grease) is not considered a waste because it can be reused and/or recycled. Used oil would be generated during operations of the Proposed Project, and would be handled, collected, transferred and reused/recycled in accordance with applicable Federal, state and local regulations.

3.2.1.2 WATER RESOURCES

3.2.1.2.1 Floodplains and Wetlands

Pursuant to 10 CFR Part 1022, DOE reviewed the Illinois Department of Natural Resources (IDNR) Ecological Compliance Assessment Tool (EcoCAT) and the USFWS National Wetlands Inventory (NWI) (USFWS 2009). The IDNR 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. The USFWS National Wetland Inventory provides information on the extent and status of the Nation's wetlands. According to the IDNR EcoCAT and the USFWS National Wetlands Inventory, there are no wetlands in the vicinity of the Proposed Project location. Documentation associated with the consultation with IDNR is provided in Appendix C-1. The National Wetlands Inventory map of the Proposed Project location is provided in Appendix A- Figure 5.

The Federal Emergency Management Agency Flood Insurance Rate Maps (FEMA 2005) were reviewed and no floodplains were identified on the Proposed Project site (Appendix A- Figure 6).

3.2.1.2.2 Ground and Surface Water

The City of Arcola owns and operates its own water distribution system. Arcola receives its treated water from the Illinois-American Water Company. Treated water is piped from Champaign, Illinois to Arcola. No private wells are expected to occur within 610 meters (2,000 feet) of the Proposed Project and no private wells would be impacted by the Proposed Project.

In compliance with the *Clean Water Act*, the project site was investigated for surface water bodies. An un-named lake exists near the northeastern border of the Proposed Project area, approximately 267-meters (876-feet) from the proposed turbine location. Another un-named lake occurs in a residential development in Arcola that is approximately 625 meters (2,050 feet) from the proposed turbine location. These identified surface water bodies would not be impacted by the Proposed Project. The nearest stream is the Kaskaskia River, which is located 7.9 kilometers (4.9 miles) west of Arcola.

Construction of the single wind turbine is not anticipated to have an adverse impact on surface, ground and drinking water resources in the project area. No runoff or discharges from the Proposed Project construction area would directly enter streams or rivers. Construction would be carried out in accordance with an approved NPDES permit, Stormwater Pollution Prevention Plan, and in compliance with all other applicable requirements and regulations. The project would also follow applicable sediment and erosion pollution control BMPs.

3.2.1.2.3 Wild and Scenic Rivers

DOE reviewed the IDNR website (http://www.dnr.state.il.us/) and the National Park Service's national rivers inventory website (http://www.nps.gov/ncrc/programs/rtca/nri/states/il.html) (DOI, 2010). The Proposed Project site is not located within a waterway, corridor, or drainage area of a stream or river protected under State Law (State of Illinois Public Act 84-1257) or a waterway included in the National Wild and Scenic River System. The nearest designated Wild and Scenic River is the Middle Fork of the Vermilion River, approximately 72 km (45 miles) northeast of the Proposed Project location.

3.2.1.3 Intentional and Destructive Acts

DOE considers intentional destructive acts (acts of sabotage or terrorism) in its EAs and environmental impact statements (DOE, 2006). Construction and operation of the proposed 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, health or safety.

3.2.2 CONSIDERATIONS CARRIED FORWARD TO FURTHER ANALYSIS

3.2.2.1 Land Use

The land use pattern in the vicinity of the Proposed Project is a combination of residential, commercial, industrial, and agricultural. The Proposed Project location is currently an active agricultural field. Immediately surrounding the Proposed Project area, there are active agricultural fields to the north and northwest. The existing Libman manufacturing facility is located 395 meters (1,300 feet) due south of the project location. A single-family residential housing development is located approximately 411 meters (1,350 feet) to the west/southwest of the project location, on the west side of N CR-900 E. Single-family homes associated with larger agricultural lots are located approximately 340 meters (1,148 feet) to the northeast, 540 meters (1,770 feet) to the northwest, and 586 meters (1,900 feet) to southeast of the project location. Another single-family residential development is located immediately east of the Libman manufacturing facility, approximately 515 meters (1,690 feet) southeast of the project location. Interstate 57 is located approximately 457 meters (1,500 feet) to the east of the project location. Construction of a new single-family residence is underway on the north side of E 300 North Road, approximately 342 meters (1,120 feet) north/northwest of the project area. Land use and the features described above can be seen in Figure 3-1, an aerial image of the project area.

On November 1, 2010, the City of Arcola adopted Ordinance No. 10-S-1 (Appendix D-15), annexing the approximately 63-acre (25.5 hectares) parcel on which the turbine would be located into the municipal boundary of the City. The parcel will have the initial zoning designation of RD (Rural Development) in accordance with Article IV 25-4-4 (Annexed Territory) of the City's Zoning Ordinance (Chapter 25 of the City's Municipal Code Book), until special action of the City Council assigns such land to another district. The code further states, "The intent of this chapter [in] establishing a Rural Development District is to provide a holding zone for areas required for future urban development and to promote the logical growth of uses in the community. Such areas will be zoned in accordance with the use designations appearing on the general land use plan map when logical extension of utilities and facilities can be insured. This will discourage haphazard and premature development from occurring at the fringes of the community."

While additional residential and commercial development exists to the south/southeast of the project area, the predominant land use surrounding the project to the west, north, and east is agricultural. The center of Arcola is located approximately 3.1 kilometers (0.73 miles) south of the proposed turbine location. There are no airports within 5 miles of the proposed turbine location.

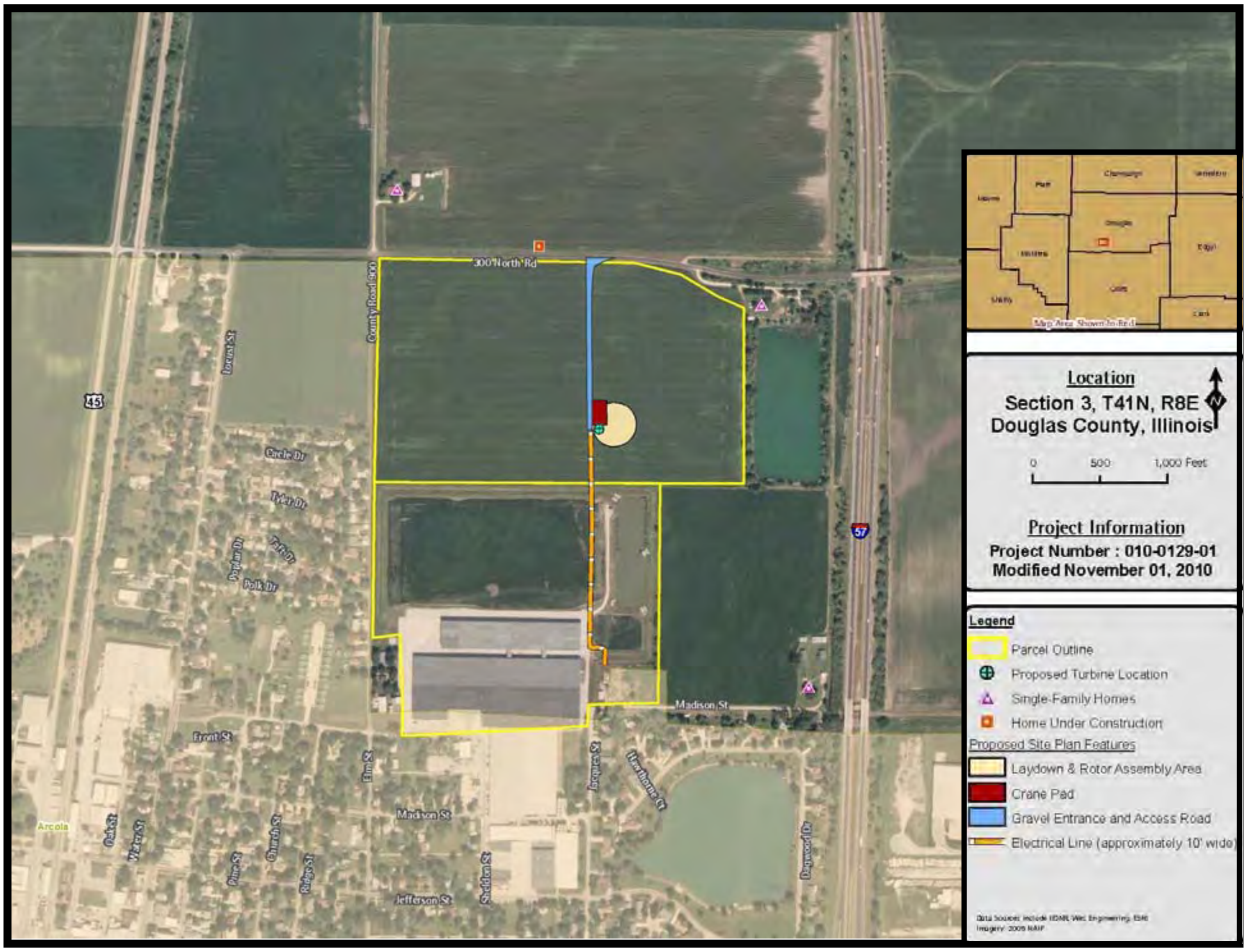


Figure 3-1. Project Location on Aerial Image

Direct and Indirect Impacts

Implementation of the Proposed Project would permanently commit 0.78 acre (34,100 square feet/0.32 hectare) and temporarily commit approximately 2 to 3 acres (less than 130,680 square feet/1.2 hectares) of previously disturbed land. The general land use of the area is and would continue to be agricultural. The area immediately surrounding the proposed tower location would continue to be used for residential and agricultural purposes. The Proposed Project would have minimal and temporary impacts on land and land use in the project area.

The parcel of land in which the turbine would be located and constructed, was recently annexed by the City of Arcola, and was designated with a Rural Development zoning category. The siting of a wind turbine is consistent with this land use designation, as City of Arcola's WECS Ordinance does not consider zoning designation in a turbine's siting criteria. Additionally, the parcel is immediately adjacent to land that carries an Industrial zoning designation. Furthermore, the City's Wastewater Treatment Plant, located approximately 1,000 meters (3,280 feet) southeast of the proposed turbine location, is also categorized on the zoning map as a Rural Development district, and is in the process of installing a 40 kW wind turbine to offset electrical costs.

3.2.2.2 Visual Quality

The existing viewshed of the project area is primarily agricultural and mixed use (residential and commercial/industrial). There are three known Federal Communications Commission (FCC) registered communication towers that were identified in the general vicinity of the Proposed Project area:

- A 91 meter (299 feet) Spectrasite Communications tower located approximately 5 km (3 miles) north/northwest of the project location on the west side of N CR-901 E and north of CR-600 N;
- A 76.2 meter (250 feet) Wiley Rein & Fielding, LLP tower located approximately 1,310 meters (4,300 feet) east/southeast of the project location on the east side of Egyptian Trail, approximately 750 meters (2,460 feet) south of E CR 300N;
- A 90 meter (295 feet) Spectrasite Communications tower located at 9378 E CR-1700N, approximately 7.5 kilometers (4.66 miles) south of the Proposed Project location.

The City of Arcola also has two water towers, each approximately 42.6 meters (140 feet) tall. The west tower is located at the northeast corner of N. Oak Street and E. Jefferson Street approximately1,143 meters (3,750 feet) southwest of the proposed turbine location. The east tower is located east of Bob King Drive, north of Robin Lane, approximately 1,082 meters (3,550 feet) southeast of the proposed turbine location. There are no other prominent vertical features that occur in the vicinity of the Proposed Project. Most buildings and residences in Arcola do not have a strong vertical component. The nearest day-to-day viewers of the proposed turbine would be residences immediately adjacent to the project area and passengers of vehicles using Interstate 57, N CR-900E, and E 300 North Road.

3.2.2.2.1 Visual Simulations

To address potential concerns about the aesthetic impacts of the Proposed Project, Libman commissioned a visual simulation of the proposed turbine from various viewpoints. These viewpoints were selected with the intent to characterize predominantly unobstructed views of the Proposed Project from multiple viewing opportunities and key receptor vantage points. Digital photographs were taken from each of these viewpoints and an image of the proposed wind turbine was digitally rendered into the scene, using the appropriate scale and location. See Appendix B for these simulations.[3]

Figure 3-2 shows the location of the key observation points used in the simulation. The following describes these locations in respect to the proposed turbine from each key observation point and the extent to which the turbine is visible or obstructed.

- Location 1 (Photo 1): Looking east from Locust Street and Polk Drive (Approximately 759 meters (2,490 feet) from the proposed turbine) – Turbine partially visible, foundation and tower partially shielded by tree canopy.
- Location 2 (Photo 2): Looking southeast from N. Locust Street and E 300 North Rd. (Approximately 710 meters (2,330 feet) from the proposed turbine) - Turbine visible, foundation and tower base shielded by summer crops.
- Location 3 (Photo 3): Looking southwest from Egyptian Trail and E 300 North Rd. (Approximately 1,219 meters (4,000 feet) from the proposed turbine) - Turbine visible between utility poles, foundation and tower base shielded by summer crops.
- Location 4 (Photo 4): Looking northwest from East Madison Street and Dagwood Drive (Approximately 665 meters (2,182 feet) from the proposed turbine) - Turbine partially visible, partially obstructed by tree canopy. Tower mostly shielded by trees.
- Location 5 (Photo 5): Looking north/northeast from South Elm Street and Fishel Street (Approximately 1,682 meters (5,518 feet) from the proposed turbine) - Turbine and tower shielded by trees.
- Location 6 (Photo 6): Looking northeast from Diamond Street and West Springfield Road (Approximately 2,220 meters (7,283 feet) from the proposed turbine) - Turbine and shielded by trees and buildings.
- Location 7 (Photo 7): Looking southeast from North Elm Street and E 300 North Rd. (Approximately 500 meters (1,640 feet) from the proposed turbine) - Turbine and tower visible, base shielded by summer crops.

[3] Photo simulations are based on an original turbine location approximately 152 meters (500 feet) north of the current location under evaluation. DOE has determined that based on the minor change in proposed turbine location, the previously prepared photo simulations adequately represent the visual impacts of the turbine, and the preparation of new photo simulations is not warranted.

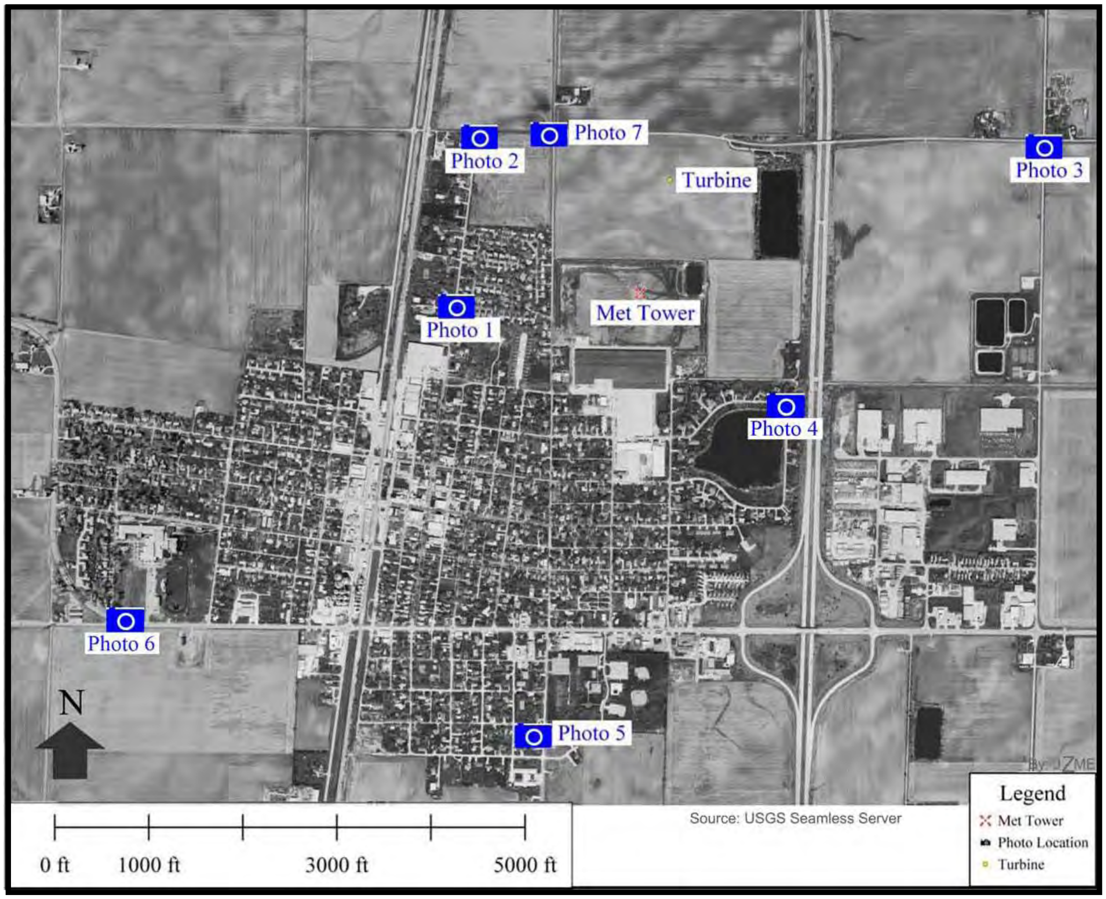


Figure 3-2. Libman Wind Energy Project Photo Simulation Locations

3.2.2.2.2 Shadow Flicker

Another potential visual impact associated with wind turbines is shadow flicker. Shadow flicker is defined as alternating changes in light intensity caused by a moving object (such as a rotating 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, etc. 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 the distance allows the shadow to diffuse (weaken). Efforts to model shadow flicker are generally limited to an area within about 1,000 meters (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. In the case of the Proposed Project, the wind turbine being evaluated (the Vensys 77, 1.5 MW turbine) has a rotor diameter of 77 meters (253 feet), so the impact area of primary concern would lie within about 770 meters (2,530 feet) of the proposed turbine site. This distance would put the residential areas to the west and south, the individual residences to the northwest and northeast, and the Libman facility itself within the area of potential concern.

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 Vensys 77 wind turbine proposed for this project operates within the range of 9 to 17.3 revolutions per minute (Vensys 2010). This would put the flicker frequency created by this wind turbine at 0.45 to 0.87 hertz, well below rates identified with photosensitivity issues.

Some data suggest that shadow flicker has the potential to cause a disorienting effect on a small segment of the population. The data also suggest that rotor rotation below 2.5 hertz can avoid such effects (BLM 2005c). As stated above, the rotor speeds involved with the project would be well below this level.

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), the turbine rotor is turning, 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 will 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.

Direct and Indirect Impacts

The Proposed Project would affect the view shed in the project area. The turbine would be a dominant vertical component in the landscape due to its height; however, the visual impact of the wind turbine is reduced because of other already existing vertical elements in the general project area (e.g., communication towers). Installation of the turbine on a landscape that already has vertical features has less of an impact than placing it on a flat landscape with no other vertical development. The visibility of the proposed wind turbine would vary by location due to area development and land use patterns. While it is not possible to quantify the visual impact of a wind energy project, visual impacts can be a concern with such projects. Concerns about the visual impacts of wind energy projects generally revolve around aesthetic impacts and shadow flicker impacts associated with the rotating turbines.

The Libman Company commissioned the "Libman Wind Shadow Flicker Study" to help evaluate the impacts of the proposed wind turbine project. This section includes a summary of the applicable findings; the entire shadow flicker study is included as Appendix D-8. The study started by using the WindFarmer software to model areas around the proposed wind turbine site that would be exposed to various durations of shadow flicker under ideal conditions. These ideal conditions, as described in the preceding paragraph, are those that would generate the highest possible amount of flicker. This initial modeling effort also did not take into consideration any physical features, such as trees or structures with no windows that would block the receptor from the sunlight (and shadow flicker). Results of this effort are summarized in the shadow flicker contour map shown in Figure 3-3 in which the contours represent the number of hours per year the area would be exposed to shadow flicker. The figure shows two views of the same map, with the "zoomed-in" view providing a closer view around the nearest residences. As would be expected, the contours extend predominantly in an east-west fashion in response to the movement of the sun. The butterfly shape can be attributed to yearly variations in the sun's relative position.

Also shown in Figure 3-3 are individual locations, numbered 1 through 29 that represent specific residences. (Location 5 is not shown because it has essentially the same coordinates as location 4.) The modeling effort generated shadow flicker durations for each of these receptors in addition to the general contour lines. Table 3-1 provides a summary of the maximum hours of shadow flicker that could be experienced at the residences. The table shows detailed information for those residences located within the 30-hour-per-year contour line and ranges of values for the other locations. This cutoff for presenting detailed information was selected for document efficiency; detailed information for each of the locations is provided in the shadow flicker study in Appendix D-8.

After modeling the maximum hours of shadow flicker that could occur, the study also evaluated conditions that would be expected to reduce these numbers. The study used representative meteorological data to develop average values for monthly distribution of wind direction and speed and for days per month of cloud cover. These were used to produce values by month and location (in relation to the wind turbine) for reducing shadow flicker due to (1) cloud cover, (2) the wind being too low or high for the turbine to operate, and (3) the wind being in the wrong direction to result in the wind turbine causing shadow flicker at a specific location. The applicable reduction values were then applied to the maximum possible shadow flicker values based on the specific months the shadow flicker would occur at a specific location. The flicker study developed one additional reduction factor based on physical features in the receptor areas that would tend to block or lessen sun light. This evaluation was limited to the presence of trees because there were no other notable features that would interfere with light from the direction of the proposed wind turbine site. The effort used detailed photographs of the area to locate trees and estimate their heights to determine effects. The study even considered the type of tree (deciduous or conifer) and the time of year the shadow flicker would occur to determine whether (in the case of deciduous trees) there would be leaves on the trees.

Table 3-1 also shows the reduction values applied to the maximum shadow flicker values and the results. The reductions are shown in two steps: one attributed to meteorological conditions and the other for the presence of physical features or obstacles that would block the sunlight. This was done because of the different nature of these two reducing factors. The meteorological-related reductions were based on multiple years of recorded data that should present reasonable estimates for average conditions at the site. The reductions for obstacles are based to some extent on subjective judgments as to the size and nature of the obstacle. Because the obstacles are limited to trees, they also represent features that could be intentionally or unintentionally (for example by wind, lightning, or disease) be removed at any time.

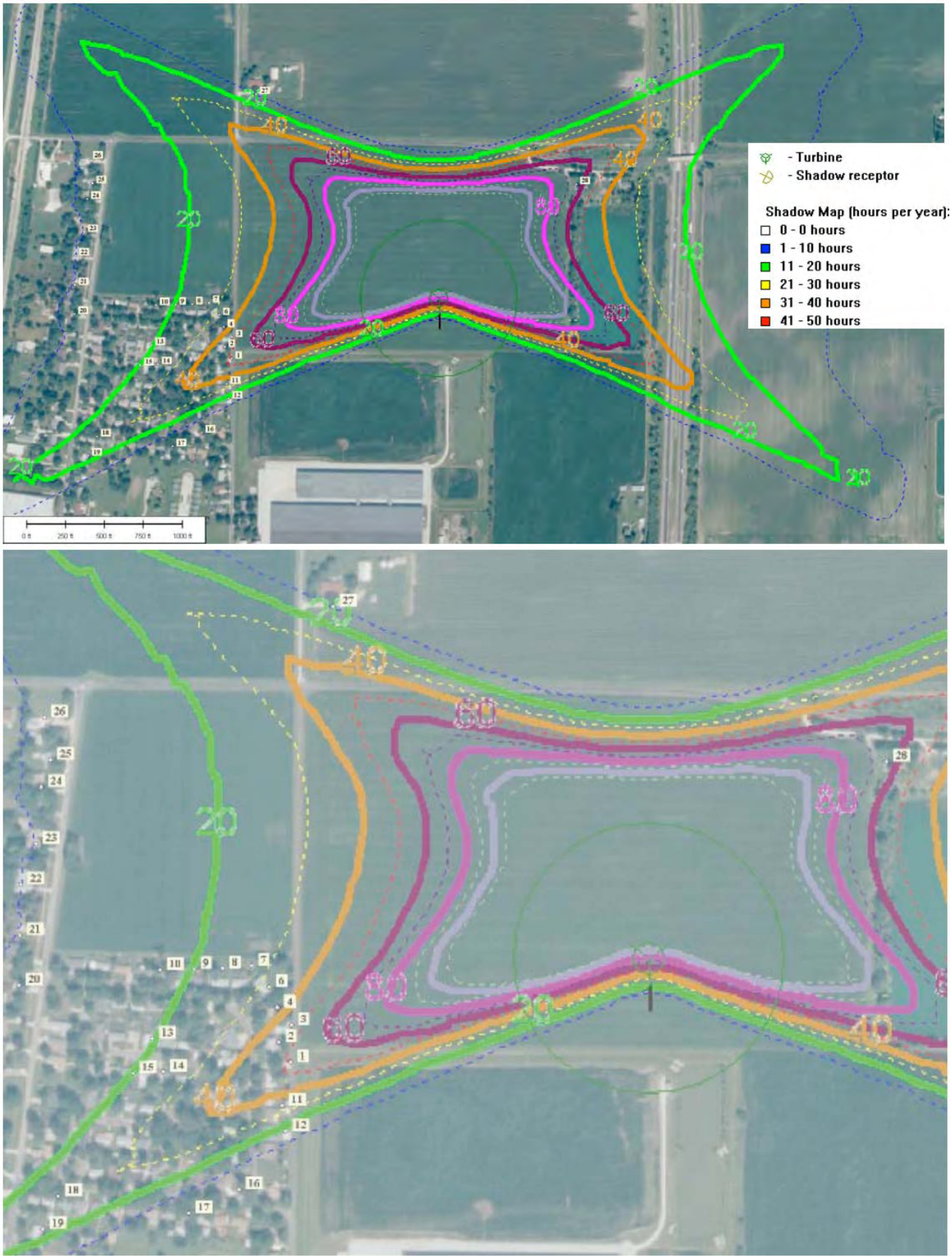


Figure 3-3. Shadow Flicker Contour Map Under Ideal (Worst Case) Conditions (Showing a Full Extent View Above and a Zoom-in View Below)

Table 3-1. Maximum Hours of Shadow Flicker that Could be Experienced Annually at Nearby Residences, and the Reduced Hours when Meteorological Conditions and Obstacles are Considered

Location Number	Maximum Shadow Flicker (hours/year)[a]	Reduction for Meteorological Conditions[b]	Reduced Shadow Flicker (hours/year)	Reduction for Obstacles	Reduced Shadow Flicker (hours/year)
1	68[c]	70.1%	20.4	95%	1.0
2	44	71.9%	12.3	70%	3.7
3	43	71.9%	12.1	55%	5.4
4	35	74.0%	9.1	80%	1.8
5	34	74.0%	8.9	80%	1.8
6	31	72.4%	8.6	65%	3.0
11	39	68.4%	12.3	0%	12.3
28	67	75.5%	16.4	15%	14.0
Others					
16 & 17	0		0		0
Remaining	6 to 28	66.2% to 76.6%	1.5 to 8.9	0% to 95%	0.2 to 4.2

a. These are the maximum values under ideal conditions for shadow flicker generation. These ideal conditions include no clouds; the wind turbine operating at all times; the wind direction being along the line formed by the sun, the turbine, and the receptor; and no obstacles between the wind turbine and receptor that would block sunlight.

b. The values shown here for reductions due to meteorological conditions are composites of three different values from the shadow flicker study in Appendix D-8. The values in the shadow flicker study varied by location and consisted of the following: (1) a reduction for complete cloudiness that ranged from 38.3 to 59.7 percent (partially cloudy days were not considered); (2) a reduction for times when the wind would be too high or too low for the turbine to operate, that ranged from 8.5 to 19 percent; and (3) a reduction for times when the wind direction (and the resulting turbine rotor position) would not support generation of shadow flicker at the location, that ranged from 27 to 51.1 percent.

c. It can be seen in Figure 3-3 that the location of residence number 1 does not correspond to a value of 68 on the shadow flicker contour lines. WES Engineering, preparer of the shadow flicker study in Appendix D-8, they were asked by DOE about this apparent discrepancy. WES Engineering was able to verify the 68 hour per year value and indicated the model's algorithm that generates values for plotting apparently does not do well in certain areas, such as along the axes that form the "butterfly" lobes of the figure, where values change rapidly with lateral distance.

As shown in Table 3-1, the residential locations that could be affected the most by the phenomenon of shadow flicker could theoretically experience as many as 67 or 68 hours of flickering over the course of a year. Flickering could occur over periods of 10 to 50 minutes a day for several months when the specific receptor location was lined up with the wind turbine and the sun. It would occur in the mornings for the receptors on the west side of the wind turbine and in the evenings for receptors to the east. The modeling that was performed and described in the shadow flicker study in Appendix D-8 provides specific times and days of the year that flickering could occur for each of the evaluated locations.

Although the maximum hours of shadow flicker exposure are considered possible, they would require a specific alignment of several variables to occur every time the sun and the wind turbine were in the right relative position. Given the natural variability of wind speed and direction and the distribution of cloudy days, it is not reasonable to expect the maximum hours to occur. Based on the reductions calculated in the shadow flicker study and summarized in Table 3-1, it is more reasonable to assume that variable meteorological conditions will cause the highest exposure to be in the range of 20 hours or less per year. If consideration is given for the trees that are currently in place between the receptors and the wind turbine, these values would be expected to drop further such that the exposures would be closer to 10 hours or less per year. Given that the reduction factors were generated from averages of weather data, actual shadow flicker could vary from year to year, but over multiple years, average exposures would be expected to be consistent with the reduced values.

There are no firm criteria on what is acceptable or unacceptable in terms of exposure to shadow flicker. The level of annoyance is very subjective and depends on how the exposed portion of the facility is being used, and on the individual observer. Furthermore, mitigation measures can be as simple as hanging drapes or blinds or planting screening vegetation. There are, however, some guidelines or reference points on what some might term “acceptable levels” of exposure to shadow flicker occurrences. The Danish Wind Industry Association identifies a court case in Germany in which a judge set 30 hours of actual shadow flicker per year as a tolerable level (DWIA 2003). The National Wind Coordinating Committee, a collaboration of U.S. industry and government groups, identifies shadow flicker of 20 to 30 hours per year as the threshold for concern (NWCC 2006). Based on this information, all of the residential locations in the vicinity of the proposed wind turbine would be expected to experience average exposure levels deemed tolerable when considering the meteorological reductions alone. Levels in this at these receptors, as shown in Table 3-1, would be at or below the threshold of potential concern based on National Wind Coordinating Committee criteria.

The map from the shadow flicker study (Figure 3-3) shows that certain roads near the proposed wind turbine site would also experience shadow flicker, with maximum exposure levels in the range of 40 to 50 hours per year. This includes short segments of three primary roads: I-57 to the east of the project site, East County Road 300 North to the north, and North County Road 900 East to the west. With reductions to account for non-ideal meteorological conditions, it is estimated these road segments would experience exposures in the range of 10 to 15 hours per year. Drivers passing through these road segments during a shadow flicker event would have an experience comparable to driving late or early in the day while sunlight flickers through nearby trees, vegetation, or other tall structures; that is, conditions experienced often by most drivers.

A single wind turbine operating near the Libman Company facility in Arcola, Illinois would not be expected to generate significant shadow flicker impacts. It is recognized, however, that some individuals might find any exposure to shadow flicker unacceptable. As a good faith effort to allay concerns of area residents over potential impacts from shadow flicker, Libman has agreed to not operate the turbine between the hours of 6:00 a.m. and 9:00 a.m. on days when such operation would cast shadow flicker on residences to the west of the project. This represents approximately 80% of all potential shadow flicker impacts that the turbine could create. Libman committed to use a shadow impact equipment/software to control the turbine (see Appendix D-21 for a representative specification of a shadow impact control product). This equipment/software tool would be pre-programmed with the exact days and times that shadow flicker is to impact nearby receptors. The module would automatically shut the turbine down during those times when the turbine would cast shadow flicker on residents to the west. The module would be installed with a sunlight sensor, if the sensor determines that it is a cloudy day during these impacts times, then the turbine would continue to operate as normal. For any resident impacted by shadow flicker, Libman would also use commercially reasonable efforts to remedy any potential problems due to shadow flicker on a case-by case basis by undertaking measures such as trees or vegetation plantings, or purchasing blind or awning installations for residents.

3.2.2.3 Noise

Sound is a result of fluctuating air pressure. The standard unit for measuring sound pressure levels is the decibel (dB). A dB is a unit that describes the amplitude (or difference between extremes) 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 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 [i.e., using the A-weighting filter adjusts certain frequency ranges (those that humans detect poorly)] (Colby, et al., 2009). Typical indoor and outdoor sound levels are shown in Table 3-2.

Table 3-2. Typical Outdoor and Indoor Sound Levels

Common Outdoor Sound Levels	dB(A)	Common Indoor Sound Levels
		Rock Band
Jet flyover at 1,000 ft	110	
Gas Lawnmower at 3 ft	100	Inside Subway Train (New York)
Diesel Truck at 50 ft Noisy Urban Daytime	90	Food blender at 3 ft Garbage Disposal at 3 ft
Gas Lawnmower at 100 ft	80	Very loud Speech at 3 ft
Commercial Area Heavy Traffic at 300 ft	70	Normal Speech at 3 ft
	60	Large Business Office Quiet Speech at 3 ft Dishwasher Next Room
Quiet Urban Nighttime	50	Small Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	40	Library
Quiet Rural Nighttime	30	Bedroom at Night Concert Hall (Background)
	20	Broadcast and Recording Studio
	10	
	0	Threshold of Hearing

Noise is any unwanted, undesirable sound. It has the potential to interfere with communication, damage hearing, and, in most cases, it is viewed as an annoyance. Noise can occur in different volumes and pitches depending on the type of source and distance from the source. It is important to consider the amount of noise that would be created during both the installation and operation phases of a project so as to not inconvenience people working or living in the surrounding areas (HUD, 2009).

The U.S. EPA identifies noise levels necessary to protect public health and welfare against hearing loss, annoyance, and activity interference in their document, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," (April 2, 1974). These noise levels are generally in terms of an average of acoustic energy over periods of time such as 8 hours or 24 hours, but include evaluations over long periods of time such as years. A cumulative 24-hour measure of noise accounts for the moment-to-moment fluctuations in A-weighted decibel levels due to all sound sources during 24 hours, combined. For example, a location with a 24-hour energy average of 70 dBA could experience occasional higher noise levels, so long as a sufficient amount of quieter time is experienced during the 24 hours.

A 24-hour exposure level of 70 dBA is indicated by EPA as the level of environmental noise at which any measurable hearing loss over a lifetime may be prevented, and levels of 55 dBA outdoors and 45 dBA indoors are defined as preventing activity interference and annoyance to human receptors. In noise-sensitive areas such as where people sleep, EPA modified these latter criteria by making them Day Night Average Sound Level (DNL) values. The DNL values represent energy averages over a 24-hour period, but a 10 decibel penalty is added to sounds that occur during the 9 hours between 10:00 p.m. and 7:00 a.m. Accordingly, in residential areas, for example, EPA’s guidelines for sound levels to avoid activity interference and annoyance are DNL levels of 55 dBA outdoors and 45 dBA indoors. These levels of noise are those at which spoken conversation and other daily activities such as sleeping, working and recreation, can readily occur.

In 1981, the Federal government concluded that noise issues were best handled at the state or local government level. As a result, the EPA phased out Federal oversight of noise issues to transfer the primary responsibility of regulating noise to State and local governments. The EPA 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). While only the IPCB noise regulations are legally enforceable; the EPA's guidelines are a useful resource for analyzing a project's noise impacts. The Illinois Pollution Control Board (IPCB) noise regulations are set forth in Illinois Administrative Code Title 35, Subtitle H, Chapter I, Part 901 Sound Emissions Standards and Limitations for Property-Line Noise-Sources. The Illinois Administrative Code sets limits of allowable sound criteria for a variety of different land classifications (i.e., business, industrial, agricultural, residential). The applicable IPCB regulations are shown in Table 3-3 and apply to noise generators and receptors in relation to their respective property lines. IPCB noise regulations are legally enforceable.

Table 3-3. Allowable Octave Band Sound Levels (in dB), by Land Classification and Time of Emission, Emitted to any Receiving Class A Land

Octave Band Center Frequency (Hertz)	Class C Land		Class B Land		Class A Land	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
31.5	75	69	72	63	72	63
63	74	67	71	61	71	61
125	69	62	65	55	65	55
250	64	54	57	47	57	47
500	58	47	51	40	51	40
1000	52	41	45	35	45	35
2000	47	36	39	30	39	30
4000	43	32	34	25	34	25
8000	40	32	32	25	32	25

Source: Illinois Administrative Code Title 35, Subtitle H, Chapter I, Part 901 Sound Emissions Standards and Limitations for Property-Line Noise-Sources.

Because the Illinois regulations are presented in terms of octave bands, including low frequency bands, the appropriate units are decibels, not A-weighted decibels as used in many standards and guidelines. The proposed location for the Libman Wind Energy Project is on property actively used for agriculture, just north of the Libman manufacturing facility. The closest property to the turbine location is the Libman facility, which is located on property that is zoned for industrial use (Arcola, 2007). Both industrial and agricultural land uses would qualify as Class C Land according to the land classification guidelines included in the ICPB noise regulations (Appendix D-9). Further, the land classification guidelines include an entry for “alternative energy source” that is also considered a Class C Land and which would be consistent with the wind turbine operation. Based on this information, sound levels from the wind turbine would have to meet the sound level criteria for Class C Land, with the applicable sound levels in Table 3-2 being the maximum allowable levels at the nearest Class A Land, which would be the residences primarily to the west, but also the isolated dwellings to the northwest and northeast (as shown in Figure 3-1).

The City of Arcola has also developed noise requirements that would be applicable to the proposed wind turbine. Chapter 26, WECS, of the Arcola Municipal Code would require sound levels from the wind turbine to meet the IPCB noise regulations. Plus it would require that audible sound from the wind turbine not exceed 55 dBA, as measured at the property line of any residence not a participant in the wind turbine’s construction.

Existing Conditions

The Libman Company commissioned a “Wind Turbine Sound Modeling and Ambient Noise Assessment” (or simply sound assessment) to establish baseline sound conditions in the area of the proposed wind turbine as well as to evaluate the impacts of the wind turbine’s operation. This section includes a summary of the applicable findings; the entire sound assessment is included as Appendix D-7. To determine baseline conditions, the sound assessment effort selected three sound monitoring sites as shown in Figure 3-4. The monitoring sites surround the proposed wind turbine site and were selected to be representative of the residential receptor areas that would be the closest to the wind turbine.

Figure 3-4. Monitoring Sites for Measuring Baseline Sound Conditions

Sound measuring equipment was set up at all three sites so that measurements could be made over the same 24-hour period at each. The sound measuring equipment was operated from mid-day on October 7, 2010 to mid-day on October 8, 2010. Table 3-4 provides a summary of the baseline sound monitoring results. The sound assessment in Appendix D-7 provides much more information on the ambient noise monitoring effort, including hourly values for each of the sound parameters shown in the table as well as for other parameters. The assessment also presents the measured data by octave bands and provides photographs of the specific equipment set-ups and locations for the measurements.

Table 3-4. Summary of Baseline Sound Monitoring Results in A-weighted Decibels

Monitoring Site	Distance to Turbine Site (m)	L_{eq} 24-Hr Average	L_{min} Lowest 1-Hr Value	L_{min} 24-Hr Average	L_{max} Maximum 1-Hr Value	L_{max} 24-Hr Average	L_{50} 24-Hr Average	L_{90} 24-Hr Average
Site 1	440	54.5	36.4	41.2	84.9	76.6	48.7	45.0
Site 2	350	60.3	37.8	49.1	76.7	71.8	58.8	54.2
Site 3	540	58.1	29.9	40.8	87.9	81.8	49.7	45.0

L_{eq} = Equivalent A-weighted sound level over a given time interval (24 hours in this case). This is a single number that, if continuous during a specific period would contain the same total energy as the actual time-varying sound. The L_{eq} is the energy-averaged sound level over the applicable time interval.
L_{min} = Minimum sound level (in dBA)
L_{max} = Maximum sound level (in dBA)
L_{50} = The sound level (in dBA) that is exceeded 50 percent of the time, frequently used as a measure of the median sound level.
L_{90} = The sound level (in dBA) that is exceeded 90 percent of the time, frequently used as a measure of ambient sound levels.

Although Site 2 did not have the highest maximum sound values, it can be seen that on average it was the “noisiest” site. This is attributed to the close proximity of the property to Interstate-57 to the immediate east of this location. Many of the sound parameters for Sites 1 and 3 were very similar, although Site 3 had the higher average equivalent sound (L_{eq}) value. Site 3 also had the quietest 1-hour value, which may be attributed to its relatively isolated location.

Direct and Indirect Impacts

Noise produced during project construction would be a result of heavy equipment at the site. Sound levels from typical construction equipment (for example, bulldozers, rollers, or other heavy equipment with diesel engines and limited movement) are generally in the 80 to 90 dBA range at a distance of 50 feet (EPA 1974). Assuming two of the noisiest pieces of equipment were operating at the same time and that sound intensity decreases over distance as a result of geometric spreading of the sound levels (resulting in a decrease of about 6 dB per doubling of the distance from the source), it is estimated that sound levels (occurring only during the daytime) would exceed the guideline set by the EPA for residential day-night average noise of 55 dBA (EPA 1974) for a distance of about 2,230 feet (680 meters). The private residences closest to the proposed wind turbine site, including the isolated dwellings to the northeast and northwest, as well as the residential areas to the west and south (Figure 3-4), would all fall within this distance. Sound attenuation factors such as air absorption and ground effects from terrain and vegetation would be expected to decrease the distance at which construction noise would be 55 dBA or greater. Per Table 3-1, noise levels experienced at the residences during construction would be similar to those of a normal office and from conversations. In addition, the sounds would be relatively short-term and would occur only during the daytime when they would be less apt to interfere with sound-sensitive activities such as sleeping.

Noise produced during decommissioning of the wind turbine would be expected to be very similar to, if not less than, that generated during construction. That is, with appropriate control of nighttime activities, noise impacts would be minimal and temporary. Accordingly, the remainder of this section describes potential noise impacts from wind turbine operations.

Operating wind turbines 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). The Vensys 77, 1.5 MW wind turbine, with a hub height of 85 meters (279 feet), and rotor diameter of 77 meters (253 feet), that was selected for this project has several characteristics that reduce aerodynamic sound levels in comparison to other, primarily older wind turbine designs. It is an upwind turbine, meaning the turbine faces into the wind and the wind encounters the rotor blades before the tower and the nacelle, making for quieter operations than a downwind turbine. It has relatively low rotational speeds and pitch control on the rotors, both of which reduce sound levels. The Vensys wind turbine is also a variable speed design, which is quieter than a fixed speed turbine because it can operate at slower speeds in low winds resulting in a quieter operation in low winds (BLM 2005a).

As described in Appendix D-5, acoustic specifications for the Vensys 77 wind turbine indicate octave band sound power levels at the nacelle shown in Table 3-5. The unadjusted octave band levels total a sound power level of 103.4 dB. Also shown in the table are the adjusted values at each of the octave bands that put the sound levels in terms of A-weighted decibels. As can be seen, the total sound power decreases to 100.7 after the very low and very high frequency components are de-emphasized by the weighting process. The sound levels shown in Table 3-5 represent the maximum values for this wind turbine and they occur at a wind speed of 7 meters per second (16 miles per hour). The Vensys 77 has a cut-in wind speed of 3 meters per second (6.7 miles per hour) and a cut-out wind speed of 22 meters per second (49 miles per hour). The wind turbine makes less noise at wind speeds lower than 7 meters per second and the noise levels do not increase at the higher wind speeds. The maximum sound levels are used in this evaluation to present the most conservative scenario.

Table 3-5. Vensys 77 1.5 MW Wind Turbine Maximum Sound Power Levels

Frequency (Hz)	31.5	63	125	250	500	1,000	2,000	4,000	8,000	Total
Sound Power Level (dB)	85	87.46	94.35	97.68	96.55	96.23	94.01	89.72	78.15	103.4
Adjusted Sound Power Level (dBA)	46	61.26	78.25	89.08	93.35	96.23	95.21	90.72	77.05	100.7

Note: As described in Appendix E, the wind turbine specifications did not include a sound power level for the octave band centered on 31.5 hertz, and the 85 dB value shown here is an estimated value.

Table 3-2 shows some sound pressure levels associated with common activities measured in dBA. For comparison, the sound from a wind turbine at distances between 1,000 and 2,000 feet (305 and 610 meters) is generally within 40 to 50 dBA (Colby, et al., 2009). Consistent with this generality, Figure 3-5 shows the predicted noise map from Appendix D-7 for the Vensys 77 wind turbine at maximum sound levels. The sound assessment effort used a standard sound propagation model (in this case “Windfarmer” software was used) to estimate the sound levels that would be experienced in the vicinity of the operating wind turbine. The 40 dBA ring extends approximately 340 meters (1,100 feet) from the proposed wind turbine location. The black numbers, 1 through 29, in Figure 3-5 represent the residences nearest to the proposed wind turbine site and which are addressed specifically in the Appendix D-7 sound assessment. None of the residences closest to the wind turbine site would be inside the 40 dBA ring. Table 3-6 provides the predicted wind turbine sound levels at several of the closest residences along with their distance from the wind turbine site. For purposes of the presentation in the table, only the residences located within the 35 dBA ring are listed. The 35 dBA sound level includes residences in each of the primary directions from the proposed wind turbine site. Again, predicted sound levels for all 29 numbered residences in Figure 3-5 can be found in Appendix D-7.

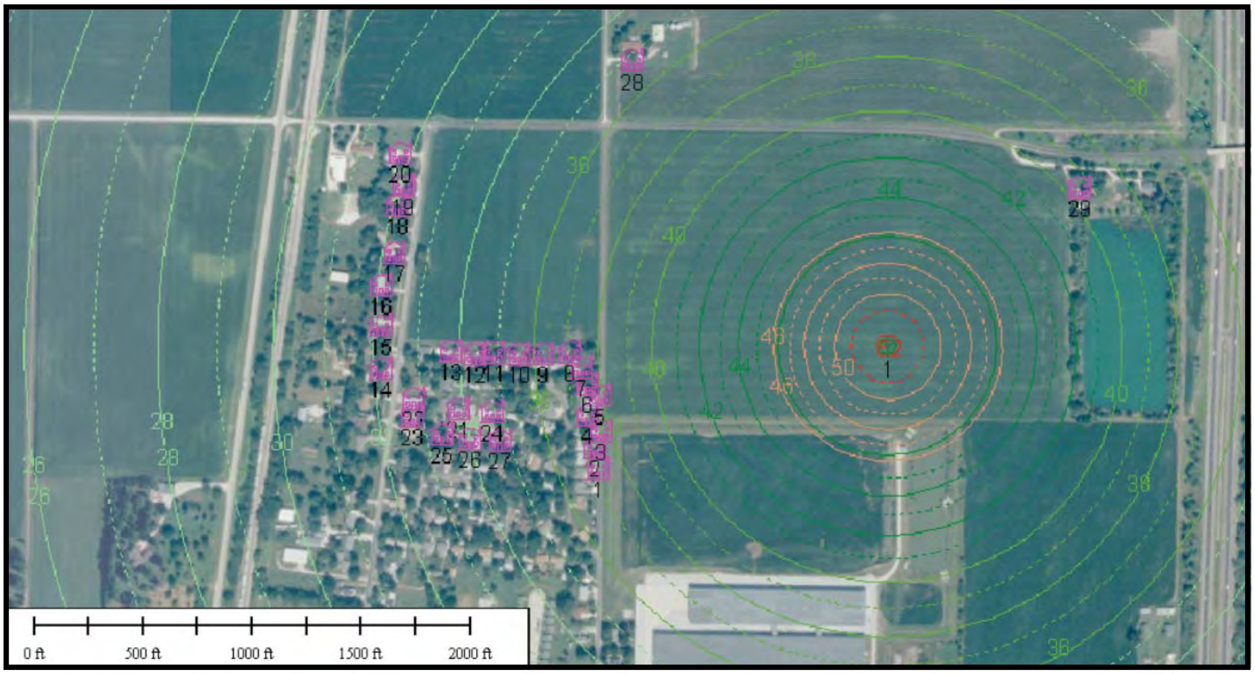


Figure 3-5. Predicted Noise Map for the Vensys 77 Wind Turbine at Maximum Sound Levels

Table 3-6. Predicted Wind Turbine Sound Levels at Nearby Residences with Applicable Standards for Comparison

Residence Number	Distance to Turbine Site (m)	Predicted Sound Level (dBA)	Predicted sound levels in unweighted decibels by octave band (identified by *hertz*)								
			31.5	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
1	440	37.2	21.5	23.9	30.8	34.2	33.0	32.7	30.5	26.2	14.6
2	433	37.3	21.6	24.1	31.0	34.3	33.2	32.9	30.6	26.4	14.8
3	419	37.7	22.0	24.4	31.3	34.7	33.5	33.2	31.0	26.7	15.1
4	432	37.4	21.7	24.1	31.0	34.4	33.2	32.9	30.7	26.4	14.8
5	410	37.9	22.2	24.7	31.5	34.9	33.7	33.4	31.2	26.9	15.3
6	424	37.6	21.9	24.3	31.2	34.5	33.4	33.1	30.9	26.6	15.0
7	429	37.4	21.7	24.2	31.1	34.4	33.3	33.0	30.7	26.5	14.9
8	446	37.1	21.3	23.8	30.7	34.0	32.9	32.6	30.4	26.1	14.5
9	482	36.3	20.6	23.0	29.9	33.2	32.1	31.8	29.6	25.3	13.7
10	515	35.6	19.9	22.3	22.2	32.6	31.4	31.1	28.9	24.6	13.0
28	538	35.1	19.4	21.9	28.8	32.1	31.0	30.7	28.4	24.1	12.6
29	349	39.5	23.7	26.2	33.1	36.4	35.3	35.0	32.8	28.5	16.9
Applicable Standards		**55**	**69**	**67**	**62**	**54**	**47**	**41**	**36**	**32**	**32**
		Arcola	**IPCB by octave band (in unweighted decibels)**								

Note: In the sound assessment of Appendix D-7, comparisons are made to the IPCB standards by adjusting the octave band standards into A-weighted values and comparing them to dBA values (by octave band) generated by the sound propagation model. In this table, the dBA values generated by the model have been adjusted to unweighted decibel values for direct comparison to the IPCB standards. As a result, the numbers shown here appear different than those in Appendix D-7, but the absolute differences between predicted sound levels and the standards are the same in either case.

The predicted sound levels in Table 3-6 are presented in the form of total dBA values (in the third column) and in unweighted decibels by octave band (in the nine columns to the right). Finally, at the bottom of the table are the applicable regulatory standards for comparison to the predicted sound levels, and include the 55 dBA required by the City of Arcola and the IPCB standards by octave band. The IPCB standards in the table are maximum allowable levels for a Class C Land during nighttime (Table 3-3) as received by a Class A Land (that is, the residential areas). The nighttime standards are shown because they are more stringent at every octave-band than daytime standards. As can be seen in the table, the sound from the proposed wind turbine, operating at its maximum sound power, would be within both local and state standards. All other residences and sound receptor locations would be further from the wind turbine site than those shown in Table 3-6 and would experience lower sound levels.

Compliance with local and state noise standards would ensure that individuals would not be harmed by sound levels generated by the proposed wind turbine, and that routine sound-sensitive activities would not be hindered. However, it is recognized that some individuals are more sensitive to sounds than others, so an additional measure of potential impacts is how sound levels from the proposed wind turbine would compare with ambient sound conditions in the area. Table 3-7 provides the predicted sound levels at the residences that would be nearest to the wind turbine and, for comparison, also shows applicable results from the ambient monitoring sites nearest to each dwelling or group of dwellings.

Table 3-7. Predicted Sound Levels at the Nearest Residences Compared to Applicable Ambient Sound Levels

Location from Wind Turbine Site	Residence Number(s) (Figure 3-5)	Predicted Wind Turbine Sound Levels (dBA)	Measures of Ambient Sound Levels (dBA)		
			L_{90}	L_{min}, lowest 1-Hr Value	L_{min}, 24-Hr Average
To the west	1 through 10	35.6 to 37.9	45.0	36.4	41.2
To the northwest	28	35.1	45.0	29.9	40.8
To the northeast	29	39.5	54.2	37.8	49.1

L_{min} = Minimum sound level (in dBA)
L_{90} = The sound level (in dBA) that is exceeded 90 percent of the time, frequently used as a measure of ambient sound levels.

It can be seen in Table 3-7 that predicted sound levels at each of the residences or residential areas would be below the L_{90} value, which is frequently used as a measure of ambient sound levels. It can also be seen that the predicted sound levels would be lower than the applicable 24-hour average minimum sound levels. Being below both these values indicates that the wind turbine sound levels, even at the loudest operating condition, would generally be below ambient sound levels in the residential areas and likely would be inaudible to individuals in those areas, even when they were outdoors. However, the information in the table shows that the wind turbine's sound levels could be higher than the very lowest sound levels measured at the corresponding monitoring stations. Individuals outdoors at such times would likely be able to discern the sounds of an operating wind turbine. The nature of wind turbine sound is quite constant in comparison to the usually fluctuating ambient sounds from other sources. Even when the ambient and wind turbine sounds are at the same or very similar decibels levels, some individuals are sensitive to this difference and can distinguish wind turbine sounds from other sources.

Low-Frequency Sounds

As shown in Table 3-5, wind turbines produce a broad-band sound; that is, the sound occurs over a wide range of frequencies, including low-frequencies. Low-frequency sounds are addressed here because some groups and individuals located in close proximity to operating turbines have alleged that these sounds cause numerous maladies (Punch et al., 2010). 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. 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). The threshold of perception, in decibels, also increases as the frequency decreases. For example, in the frequency range where humans hear best (in the low kilohertz), the threshold of hearing is at about 0 dB, but at a frequency of only 10 hertz, the threshold of hearing is at about 100 dB (Rogers 2006).

Older 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 the levels produced by older turbines.

A primary cause for low-frequency sounds in modern turbines is the blade passing through the change in air flow 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 broad band 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 118 meters (387 feet) from the turbines, all infrasound levels were below human perception levels. The report also states that there is "no reliable evidence that infrasound below the hearing threshold produces physiological or psychological 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 (Ontario CMOH 2010; Australia NHMRC 2010).

Conclusion

DOE recognizes there are sound impacts associated with the operation of wind turbines. Data collected for the proposed wind turbine location indicate expected wind turbine sounds would meet applicable state and local standards; generally would be comparable to, or less than, ambient conditions; and would not be audible to most individuals. The predicted sound levels would support the area achieving EPA's objective of having DNL levels of 55 dBA outdoors and 45 dBA indoors, which are consistent with a normal 15 dBA reduction in sound level between indoors and outdoors (with partially open windows) plus a margin of safety. With the sound level reduction that occurs between indoors and outdoors, the wind turbine's predicted sound levels would not likely cause indoor nighttime noise levels to exceed 30 dBA, which is a sound level generally recommended for sleep and consistent with World Health Organization guidelines (WHO 1999). Based on these factors, there is a potential for minor impacts to some residents in the project vicinity. However, individuals who are more sensitive to sounds may experience more of an impact than the general population.

3.2.2.4 Cultural and Historic Resources

The National Historic Preservation Act of 1966 (NHPA) is the primary Federal law protecting cultural, historic, Native American, 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 ARRA grant applicants under the Energy Efficiency and Conservation Block Grants (EECBG), Weatherization, and SEP programs 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 and Tribal Historic

Preservation Officers to initiate the review process established under 36 CFR Part 800. On May 6, 2010, representatives of Libman submitted a cultural/historical resources consultation letter to the IHPA for the Proposed Project in accordance with the submittal guidelines established by the agency (http://www.illinoishistory.gov/PS/rcdocument.htm).

The IHPA evaluated the Proposed Project in accordance with the standards for determining adverse effects in 36 CFR Part 800. IHPA used an above ground Area of Potential Effect (APE) consisting of a 1-mile radius around the Proposed Project location as the distance with the potential to cause alterations in the character or use of historic properties, if present. While conditions can vary from location to location, in general the likelihood of a clear, unobstructed vista of a wind turbine beyond one mile is small and diminishes rapidly as one travels further away from the site. In particular, the extent to which a single turbine dominates the landscape diminishes with distance. Varied topography such as elevation changes, and other site-specific characteristics such as power line corridors, structures associated with human development, tall towers, tree canopy, and natural areas of dense vegetation, all serve as common visual obstructions that block expansive views of a given project site from various directions. In conducting its evaluation, IHPA considered the potential impacts to archaeological resources within the footprint and immediate vicinity of the proposed construction area. They also analyzed the potential impacts to the character of the physical features that contribute to historic significance and integrity of significant historic features of properties listed in or potentially eligible for listing in the National Register of Historic Places (NRHP).

Concurring with the appropriateness of a 1-mile radius APE, DOE conducted a search to identify historic properties that the proposed wind turbine might adversely affect. A review of the NRHP revealed one property listed within Arcola, the Arcola Carnegie Public Library located at 407 E. Main St., approximately 1.08 kilometer (0.58 mile) southwest of the proposed turbine location. The IHPA's Historic Architectural and Archaeology Resources Geographic Information System (HAARGIS) was reviewed to identify structures potentially eligible for listing in the Register. HAARGIS identifies approximately forty sites potentially eligible for listing in the Register (status designated as "Undetermined"). All are located southwest of the Proposed Project location and consist primarily of residential structures in the older residential neighborhoods of Arcola, as well as a handful of older commercial, government, and religious buildings. The structure closest to the Proposed Project location that is potentially eligible for listing is the Justice Home (HAARGIS Reference No. 302902), located at the northeast corner of Front and Locust Streets, approximately 0.86 kilometer (0.46 mile) southwest of the proposed turbine location. Further review of the project area revealed that no National Natural Landmarks or Illinois Historic Places (IHPA's Inventory of Historic Places) were present within the APE.

Based on the sub-grantee's initial consultation with the IHPA, and IHPA correspondence dated July 22, 2010, a Phase I Archaeological Reconnaissance Survey was conducted, as IHPA indicated, "The project area has not been surveyed and may contain prehistoric/historic archaeological resources." The survey was performed and prepared by the Public Service Archaeology & Architecture Program of the University of Illinois at Urbana-Champaign. In addition to reviewing historic electronic files maintained by the Illinois State Museum, historical documents in the Illinois Public Domain Land Tract Sales database, and various historic maps, the Phase I survey evaluated the following project areas: (1) the gravel access road that leads south from E 300 North Road to the proposed turbine site; (2) the proposed turbine site; and (3) a portion of the proposed underground transmission line. The Phase 1 Archaeological Reconnaissance Study was conducted on August 10 and 17, 2010 and consisted of a pedestrian reconnaissance performed at 5 meter (16.4 feet) intervals over a total of 17.2 acres (6.96 hectares) around the Proposed Project area. A final report was submitted to the IHPA on October 4, 2010, concluding that the "archaeological reconnaissance has located no archaeological material," and recommended that a historic preservation clearance be granted. In the cover letter submitted to IHPA with the final report (Appendix C-2), it was noted that the proposed turbine location was relocated further south than the location originally submitted with a previous July 18, 2010 submittal to IHPA (Appendix C-2).[4]

According to "Indian Entities Recognized and Eligible to Receive Services" from the U.S. Bureau of Indian Affairs in 72 FR 13648 dated March 22 2007, there are no Federally recognized tribes in the State of Illinois. There are also no state recognized tribes within Illinois. However, the IHPA provided DOE with a list of tribes with an historic presence in various regions of Illinois (Appendix D-12). DOE utilized this list to determine the relevant tribes within the APE of the Proposed Project. DOE provided Public Scoping notifications to the listed contacts for the relevant tribes for their initial review and comment on the Proposed Project. DOE received no comments in response to the scoping notification. DOE also provided the tribal contacts with the NOA for the Draft EA and associated 17-day comment period. Tribal contacts can be found within the project's stakeholder list (Appendix D-11).

Direct and Indirect Impacts

As described above, one property listed on the National Register of Historic Places was identified within the APE. Considering the property's location within a well-developed residential area of Arcola, the presence of the proposed single wind turbine approximately 1.08 kilometer (0.58 mile) northeast of the Arcola Carnegie Public Library will not destroy or change the character or use of the physical features within the property's setting, nor serve as an element that diminishes the integrity of the property's historic features. Also, as previously noted, while approximately forty properties that are potentially eligible for listing in the Register are located within the APE, none is closer than 0.86 kilometer (0.46 mile) to the proposed turbine location. All such properties exist within well-developed residential and commercial sectors of Arcola, and as such, the presence of a single wind turbine over a half-mile away is not anticipated to have an adverse effect on the properties, or on their eligibility status. The subject properties also fall outside the boundaries of any noise impacts and impacts associated with shadow flicker effect. These properties are at a substantial enough distance from the proposed turbine location and have multiple buffers in between, such that potential adverse affects would not be experienced. It is DOE's conclusion that based on the information reviewed, and through consultation with the IHPA, no historic properties would be adversely affected by the Proposed Project (32 CFR per 800.4(d)(1). Based on the review of the Archaeological Reconnaissance Survey performed in the project area, DOE also concludes that archaeological resources would not be affected by the Proposed Project. On October 12, 2010, the IHPA provided a written response to WES Engineering indicating its cultural resource review was complete and

[4] The Libman Wind Energy Project previously received a no effect determination from the IHPA on May 6, 2010 for the initial proposed turbine location on the parcel immediately south of the current proposed location. The revised turbine location required additional IHPA review as described above. IHPA concluded consultation on the revised located in their letter dated Oct. 12, 2010, in which they concluded "that no significant historic, architectural, and archaeological resources are located in the project area."

concluding, “that no significant historic, architectural, and archaeological resources are located in the project area,” and further requesting that a copy of the letter be submitted to “the state or federal agency from which you obtain any permit, grant, or other assistance.” (Appendix C-2)

If archaeological resources are encountered during construction, construction activities would cease, and the IHPA would be contacted for further instruction regarding additional studies and/or potential mitigation measures required in accordance with the National Historic Preservation Act.

3.2.2.5 Geology and Soils

Geology

The project site is located on top of the Carbondale formation (ISGS 2009). According to the U.S Geological Survey (USGS), the Carbondale formations consist of about 40% shale, 20 % limestone, 15% underclay, 10% sandstone, 10% coal and <5% black shale. The area was last glaciated during the Wisconsin episode and end moraine and till plain deposits are present.

Seismic activity in Douglas County is not a considered a substantial hazard as the majority of seismic activity (81 percent) in Illinois occurs in southern Illinois.

Soil

The surficial soils associated with the Proposed Project area are characterized using the Soil Survey Map of Douglas County, Soil Conservation Service, United States Department of Agriculture (USDA) and are presented in Table 3-8.

Table 3-8. Project Area Surficial Soils

ID#	Description
722A	Drummer-Milford silty clay loam
56B	Dana silt loam
198A	Elburn silt loam
154A	Flanagan silt loam

Soils within the project area consist of Drummer-Milford silty clay loams and Dana, Elburn, and Flanagan silt loams (USDA-NRCS Soil Survey Division 2010a). Drummer-Milford silty clay loams are described as very deep and poorly drained to very poorly drained. Flanagan silt loams are very deep, somewhat poorly drained soils. Elburn silt loams are also very deep, somewhat poorly drained soils. Dana silt loams and are deep, moderately well-drained soils with moderate permeability (USDA-NRCS Soil Survey Division 2010b).

Based on the Farmland Conversion Impact Rating from (Form AD-1006) prepared by Illinois Department of Agriculture (IDOA), the project area is comprised of prime farmland. Prime farmland is defined in part as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. Congress enacted the *Farmland Protection Policy Act* (FPPA) as a subtitle of the 1981 Farm Bill. The purpose of the law is to “...minimize the extent to which Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses..." (P.L. 97-98, Sec. 1539-1549; 7 U.S.C. 4201, et seq.). The FPPA also stipulates that federal programs be compatible with state, local and private efforts to protect farmland.

Direct and Indirect Impacts

A review of information managed by the Illinois State Geological Survey (ISGS), indicated no major earthquakes or seismic activity has been recorded in Douglas County, Illinois (ISGS 1995).

The Proposed Project would permanently impact approximately 0.78 acre (34,100 square feet/0.32 hectare) of prime farmland. A request for an evaluation of impacts to prime farmland at the initial turbine location (approximately 137 meters (450 feet) south of the current location) was submitted to the Natural Resource Conservation Service office in Tuscola, IL on June 23, 2010. The review was completed by the IDOA, and on July 15, 2010, the IDOA concluded that, "the project complies with the Illinois Farmland Preservation Act." Based on the change in project location, a follow-up request was submitted to IDOA on November 8, 2010 requesting additional review of the project based on the revised project location. IDOA responded with a letter reaffirming its earlier determination that the project complies with the Illinois Farmland Preservation Act. Correspondence with IDOA, including the Farmland Conversion Impact Rating from (Form AD-1006), can be found in Appendix C-6.

Site preparation and project construction would result in soil disturbance; however, soils at the proposed turbine location have previously been disturbed as a result of agricultural activities. Libman would use BMPs and follow requirements set forth in their NPDES Permit during construction activities to protect topsoil and to minimize soil erosion. BMPs would include at a minimum the following: containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material and re-vegetating disturbed areas.

3.2.2.6 Biological Resources

Birds and bats can be injured or killed if they fly into operating wind turbines. In addition, birds, bats and vegetation could be disturbed by construction and decommissioning activities associated with the Proposed Project. The USFWS and IDNR are responsible for protecting various plant and animal species and associated habitat in the Proposed Project area. A primary emphasis of these agencies is to ensure appropriate actions are taken to reduce or mitigate potential harm to protected species and habitat.

A literature and database review was used to identify bird and bat species known to occur within or in close proximity to the project area. References include North American Breeding Bird Survey (BBS) (USGS, 2010), INHD (2010), Illinois Natural History Survey (2005, 2009) and the USFWS (2010). The regulatory status (i.e., threatened, endangered, special concern) of rare birds potentially occurring in the project area was reviewed and summarized. Bat species distributions and habitat information were obtained from Bat Conservation International (BCI).

3.2.2.6.1 Migratory Birds

The *Migratory Bird Treaty Act* (16 U.S.C. 703-7012; MBTA) implements four international conventions that provide for international protection of migratory birds. The MBTA prohibits taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests, except when specifically authorized by the U.S. Department of Interior. While MBTA has no provision for allowing unauthorized take, the USFWS recognizes that some migratory birds may be taken during activities such as wind turbine operation even if all reasonable measures to avoid have been implemented.

There is no existing bird survey data for the project area; information of breeding birds' use in the vicinity of the project area is limited to three Illinois Breeding Bird Atlas (ILBBA) survey blocks and one North American Breeding Bird Survey (BBS) route which are located within five miles of the project area. ILBBA blocks 178A3 (Arcola-3), 178A6 (Arcola-6), and 179B3 (Hindsburg-3) are located to the west, south, and east of the project area, respectively. A total of 70 species were recorded for ILBBA block 178A3 (Arcola-3), of which 38 species were confirmed to be breeding, 14 were probable breeders, and 18 were possible breeders. Thirteen of these species are Species of Greatest Conservation Need (SGCN; USGS Patuxent wildlife Research Center 2008a). A total of 2 species were recorded for ILBBA block 178A6 (Arcola-6), including the state-endangered, SGCN Common Moorhen (*Gallinula chloropus*). Both species were confirmed to be breeding in this survey block. A total of 42 species were recorded for ILBBA block 179B3 (Hindsburg-3), of which 17 species were confirmed breeders, 12 were probable breeders, and 13 were possible breeders. Eight of these species are SGCN.

There are no known major raptor migration corridors according to the USFWS's map of Fall and Spring Migratory Bird Information (Appendix A- Figures 13 and 14), no Audubon Important Bird Areas (IBAs) (Cecil et al., 2009) and no known other areas of high bird concentration or use in close proximity to the project area. The closest IBA to the Proposed Project is the Clinton Lake State Recreation Area located approximately 28 miles to the south/southeast. Additionally, highly suitable avian habitat within the project area is limited, as the project area consists mostly of active agricultural fields. The surrounding area includes primarily agricultural lands and previously developed areas in and around the Arcola. There are no riparian corridors or naturally occurring woodland habitat occurring within 2 miles of the Proposed Project area.

3.2.2.6.2 Bald and Golden Eagles

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). On August 8, 2007, the Bald Eagle was removed from the list of Threatened and Endangered Wildlife (72 FR 37345, July 9, 2007). Subsequent to the delisting, the USWFS issued a final rulemaking which provided a vehicle for limited take of Bald and Golden Eagles, where the take to be authorized is associated with otherwise lawful activities (74 FR 46836, September 11, 2009). These regulations also establish permit provisions for intentional take of eagle nests under particular, limited circumstances.

There is limited potential for bald eagles to occur on the project site as according to the IDNR EcoCAT, the nearest nesting area is located 20 miles from the site. Bald eagle habitat generally consists of large, tall trees (i.e., deciduous, evergreen trees), near rivers, streams, lakes or reservoirs (INHS, 2009). There is also limited potential for golden eagles to occur on the project site. Golden eagles are associated with mountainous regions, rocky cliffs and tall trees (INHS, 2009). According to the Illinois Raptor Center, the Illinois raptors habitat ranges from cliffs, bottomland forests and woodlands; however birds may be seen in parks and suburban areas (Illinois Raptor Center 2010). The Proposed Project site does not include suitable nesting or foraging habitats for bald and golden eagle and/or other raptors species.

3.2.2.6.3 Bats

No records of specific bat surveys in Douglas County were found. However, the project area is located in a region of moderate bat species density (Cryan 2008). Based on review of the Bat Conservation International, Inc. (BCI) Species Profile (BCI, 2010), a total of 5 bat species have geographic distributions that may include the project area including:

- Little Brown Bat (*Myotis lucifugus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Eastern Red Bat (*Lasiurus borealis*)
- Hoary Bat (*Lasiurus cinereus*)
- Indiana bat (*Myotis sodalis*)*
- Evening bat (*Nycticeius humeralis*)
- Eastern pipistrelle (*Pipistrellus subflavus*)
- Northern bat (*Myotis septentrionalis*)

* The Indiana bat is addressed in Threatened and Endangered Species section below.

All of these species, except the big brown bat, require woodland habitat for feeding or roosting at some time during the year (BCI 2010). Many of these species also forage along stream corridors or over water. The big brown bat is most abundant in deciduous forests but this generalist species will also forage over agricultural fields (BCI 2010).

A narrow, relatively limited, linear patch of trees surround the small pond which borders the northeast corner of the project area. This area may provide a very limited amount of suitable habitat. There are also patchy clusters of trees and a second small pond in the town of Arcola, which borders the project area to the southeast. Other small ponds are scattered across the landscape to the east of the project area. There are no stream corridors or extensive woodlots within or in close proximity to the project area. The agricultural fields in and adjacent to the project area may provide suitable foraging habitat for the big brown bat. The Illinois Gap Analysis indicates that predicted suitable habitat may exist for three species: little brown bat, big brown bat, Eastern red bat in the vicinity of the project area, although only as small, isolated patches (INHS 2005). The adjacent agricultural fields could provide foraging habitat for most bat species.

3.2.2.6.4 Threatened, Endangered, and Special Status Species

Information regarding the potential occurrence of federally-listed species was reviewed using the USFWS Endangered Species website, which produced a list of potentially occurring species in Douglas County, Illinois (USFWS 2009).

The USFWS lists two federally-listed species for Douglas County: the Indiana bat (*Myotis sodalis*) and the Eastern prairie fringed orchid (*Platanthaera leucophaea*; USFWS 2009). A preliminary Biological Report was provided to the USFWS indicating that the site did not provide suitable habitat for the eastern prairie fringed orchid due to its previously disturbed nature and current agricultural use.

The USFWS reviewed information provided by DOE, and then conducted research and data review regarding the Proposed Project site and Federally-listed species. In its September 10, 2010 letter, the USFWS stated that there are no summer records for the Indiana bat in Douglas County, Illinois, and the nearest known hibernaculum and designated critical habitat area is Blackball Mine in LaSalle County, Illinois (Priority 2 hibernaculum), 120 miles (193 km) north/northeast of the Proposed Project area.

The IDNR reviewed the Proposed Project and provided feedback and information concerning special-status species, habitat suitability, and other protected resources within or near the project area. As part of this review, IDNR Illinois Natural Heritage Database (INHD 2010) was searched for known occurrences of State-listed threatened or endangered species within Douglas County. Consultation with the Illinois DNR has shown that the Illinois Natural Heritage Database contains no records of State-listed species occurring in the project area or surrounding vicinity. The IDNR has therefore concluded that adverse effects to State-listed species resulting from the Proposed Project are unlikely (Branham 2010).

3.2.2.6.5 Plant Species

No native vegetation occurs in the Proposed Project area. The majority of the vegetation is cultivated crops. The lands that would be primarily affected by the Proposed Project, including the location of the turbine and transmission line, have been previously disturbed for agricultural uses. As noted above, the site does not provide suitable habitat for the Federally threatened eastern prairie fringed orchid.

Direct and Indirect Impacts

The Proposed Project site is used to produce agricultural crops and does not include any habitats that are highly suitable for common or special status species. As described in the Section 2.5 of this EA, guy wires would not be used to support the proposed wind turbine. Guy wires can be a challenge for birds and bats to locate, which makes them difficult to maneuver around and can lead to injury or death. Also, lattice towers, which have become roosting sites for birds at other wind projects, would not be used to support the wind turbine. Aviation lighting would comply with FAA requirements and USFWS guidelines to minimize impacts to birds.

3.2.2.6.6 Migratory Birds, Bald and Golden Eagles

Libman has and would continue to utilize the *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (USFWS, 2003) in its planning process. Libman has committed to incorporating all applicable recommendations and has included them as Project Proponent Committed Practices for the Proposed Project to avoid and minimize potential impacts to migratory birds and bald and golden eagles. Libman has also reviewed and will incorporate several of the BMPs from the USFWS Wind Turbine Guidelines Advisory Committee's Site

Development and Construction BMPs (March, 4, 2010). The following is a brief description of facts demonstrating that Libman will follow USFWS's Interim Guidelines. The project is a single wind turbine located in already disturbed habitat (agriculture). Therefore, configuration of turbines is not applicable, nor does the project have potential to fragment any existing suitable habitat. The proposed turbine design is a monopole, no external features are proposed to the design and all electric lines would be placed underground. The Proposed Project would require a permanent access road and temporary disturbance of approximately 2 to 3 acres. However the area around the turbine is an active agriculture field and does not provide highly suitable bird habitat. Construction BMPs would be implemented as part of the Proposed Project. All areas except for the 0.78 acre (34,100 square foot/0.32 hectare) footprint of the wind turbine, crane pad and access road would be recontoured and expected to be returned to active agricultural use. Aviation lighting would be utilized in order to minimize potential bird and bat impacts (red flashing lights operating only at night time would be used at the minimum number, minimum intensity, and minimum number of flashes per minute allowable by the FAA).

Both the USFWS and IDNR were consulted prior to the preparation of this EA and their review of the siting of the turbine and their evaluations of the potential effects are included herein. Based on the feedback received from the USFWS and the IDNR, and DOE's own research conducted on the proposed turbine location and its potential to provide habitat to bird, bat and other wildlife species, the Proposed Project is thought to be a low risk to wildlife. The proposed turbine location is not believed to be located near a migratory pathway and is not in or near an Audubon designated IBA.

Based on the lack of suitable stopover habitat, migrating birds moving across the project area are not likely to use or stop at this site. The potential for project impacts to non-migrating birds is greater for grassland bird species than for forest bird species or waterfowl, given the land cover composition within the project area. The predominance of active agricultural fields in the vicinity of the Proposed Project, and lack of highly suitable nesting or foraging habitats may lower the overall risk to birds from the project. Avian habitat within the project area is already of limited quality, given the predominance of the existing field and proximity to human development. Therefore, the footprint of the Proposed Project would not be likely to cause disturbance to networks of high-quality avian habitat in the region. Moreover, wind farms typically only result in the loss of 0.7-1.0 acre per turbine, leaving the majority of existing habitats on the project area intact (Strickland, 2004). Migratory bird mortalities may occur (if birds are attracted to the lighted turbine and/or disoriented during stormy or foggy nights), but based on the scale of the project and the plan to limit lighting, any fatalities that occur are unlikely to impact avian populations.

Based on the information prepared and presented to the USFWS for this project and consultation with the IDNR, there are no records of bald eagle nesting sites for the project area or surrounding vicinity. Due to the lack of highly suitable habitat, it is unlikely that bald/golden eagles would be present in the project area. Implementation of the Proposed Project is not likely to adversely affect or impact bald/golden eagles.

3.2.2.6.7 Bats

The project site is not considered highly suitable bat habitat. Recent studies from Wisconsin for three wind facilities (Blue Sky Green Field, Cedar Ridge, and Forward Energy) estimated annual bat fatality per turbine for those three wind turbines were 41 for Blue Sky Green Field, 50 for Cedar Ridge, and 71 for Forward Energy (Drake et al., 2010). Other studies have shown a lower range of bat fatalities per turbine. Data from the 33-turbine Crescent Ridge Wind Power project in Bureau County showed on average of three bats killed per turbine per year (Kerlinger et al., 2007). For three sites in the Midwestern U.S. (Buffalo Ridge, MN, Lincoln, WI, and Top of Iowa, IA), fatalities ranged from 2 to 8 bats per turbine (Arnett et al, 2008). Cedar Ridge, Blue Sky Green Field, and Top of Iowa found a relatively high proportion of the common little brown bat (14, 28.6, and 23.5 percent respectively). These high proportions of little brown bats are unlike those found at Crescent Ridge, Illinois (Kerlinger et al. 2007) and Buffalo Ridge, Minnesota (Osborn et al. 1999) and may have contributed to higher overall bat mortality (BHE, 2010). Given that the Libman project consists of a single turbine and the site is located in a region of moderate bat species density, bat fatality for the project is likely to be on the low end of this range. Therefore impacts to bat populations would be minimal.

3.2.2.6.8 Threatened, Endangered, and Special Concern Species

The Proposed Project site does not include suitable wintering habitat (hibernacula), and there is no known highly suitable foraging habitat for the Indiana bat in the area. Mature trees and/or undisturbed habitats do not occur on the site and the surrounding area is predominantly agricultural. The nearest known summer (maternal roosting) habitat is at Middle Fork River County Forest Preserve (Vermilion County), approximately 57 miles to the northeast of the Proposed Project location. The risk to migrating bats is difficult to characterize because little is known of the migratory patterns of this species (Appendix C-5, USFWS Concurrence Letter). Furthermore, expanses of 305 meters (1,000 feet) or greater are not generally spanned by Indiana bats and it is believed use of the non-contiguous habitat is unlikely. Based on these facts, DOE determined that the project may affect but is not likely to adversely affect the Indiana bat.

On September 10, 2010, the USFWS concurred with DOE’s determination that there would be no effect to the prairie-fringe orchid and that the Proposed Project may affect but is not likely to adversely affect the Indiana bat (Appendix C-5). Therefore implementation of the Proposed Project is not likely to adversely affect or impact threatened, endangered, and/or special concern species. Thus, DOE has completed consultation with USFWS as required under Section 7 of the Endangered Species Act.

Based on the project information presented to IDNR for this project, there are no records of State-listed threatened, endangered, and/or special concern species for the project area or surrounding vicinity. Based on consultations with IDNR and based on the lack of highly suitable habitat occurring in the project area, it is unlikely that State-listed threatened or endangered species would be affected by the Proposed Project.

3.2.2.6.9 Plant Species

The land areas that would be affected by the wind energy project include the foundation of the turbine and transmission line trenching. These areas have already been previously disturbed through agricultural practices and do not support native habitats. No impacts to plant species from the implementation of the Proposed Project are likely.

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 as 1.1 times the total turbine height or approximately 139 meters (456 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 MW 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 improper maintenance (Global Energy Concepts 2005). No residences (or areas zoned for residential use) are located within the fall zone of the turbine. No existing Libman facilities are located within the fall zone.

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 (77 meters, or 253 feet, in this case) of the tower base is about 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).

The project is not located within the immediate vicinity of a local or regional airport or a military air base. All structures more than 61 meters (200 feet) tall, as in this case, are required to have aircraft warning lights in accordance with requirements specified by the FAA.

Direct and Indirect Impacts

All contractors, subcontractors and their personnel would be required to comply with all Federal and state worker safety requirements. The construction contractor and facility operator would prepare a Health and Safety Plan pursuant to OSHA requirements before commencing work, and by following this plan, greatly reduce the potential for worker injuries and fatalities.

Project facilities have the potential for members of the public to attempt to climb towers, open electrical panels or encounter other hazards. Safety signage would be posted around the tower (where necessary); transformers and other high-voltage facilities would be in conformance with applicable Federal and state regulations.

No adverse public security impacts are anticipated as a result of the Proposed Project. Due to the remoteness of the project area, security fencing is not anticipated during the construction period. Libman would, however, follow all local requirements with respect to securing the work site. Safety signage may be posted around the tower (where necessary); transformers and other high-voltage facilities would be in conformance with applicable Federal and State regulations. Libman employees would be educated as to the security procedures to be observed when they are in the vicinity of the turbine. The project location was selected so that, in the unlikely collapse of the turbine tower, lightening strikes or ice throw, no existing structures, routine public access areas or roads would be impacted.

Based on the extreme rarity of tower collapse or blade throw, the risk to public safety due to such occurrences can be mitigated by limiting access within the fall zone. 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 limited temporal basis. The nearest public area (residences to the northeast) is approximately 350 meters (1,148 feet) away from the proposed wind turbine location, which is outside the ice throw or fall zone areas. The turbine system would have an automated sensor for interior nacelle temperature and shut off when it’s too high, such as in the event of a fire.

No fuel would be used during the operational phase of the Proposed Project, therefore 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.

According to the FAA in a letter dated October 18, 2010, the aeronautical study preformed for the Proposed Project 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, it was determined that the structure would not be a hazard to air navigation provided the structure would be marked or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2. A copy of FAA's letter is included (Appendix C-3).

3.2.2.8 Transportation

The project site, as well as the entire Libman manufacturing facility, is primarily served by East Jefferson Street to the south, North Sheldon Street to the West, and North Jacques Street to the East. Interstate-55 is less than 0.5 miles to the east of the Libman facility. Access to the local interstate transportation system is available at I-55 to the east and I-74 to the west of the proposed turbine location. The most direct access route to the Libman property is from State Highway 133 (East County Road 200 N) using North Sheldon Street.

Construction equipment and deliveries would likely arrive at the site via Interstate-57, State Highway 133, and North Sheldon Street. Large pieces of equipment, including the turbine tower, rotor blades, and nacelle would be designated as oversized loads.

A plan has not been finalized regarding transportation of project materials and equipment. In accordance with the City of Arcola WECS Ordinance, prior to turbine construction, Libman would be required to:

- Identify all city roads proposed for the purpose of transporting the turbine components or substation parts and/or equipment for construction, operation, or maintenance of the necessary equipment, and
- Obtain applicable weight and size permits from relevant government agencies.

Additionally, to the extent that Libman must obtain a weight or size permit from the City, it would be required to:

- Conduct a pre-construction baseline survey to determine existing road conditions for assessing potential future damage,
- Secure financial assurance, in a reasonable amount agreed to by the relevant parties, for the purpose of repairing any damage to public roads caused by constructing, operating, or maintaining the proposed turbine, and
- Enter into a Roadway Use and Repair Agreement approved by the City. Said agreement shall at a minimum comport with the requirements of a Road Agreement Form to be approved by the City.

Direct and Indirect Impacts

A permanent gravel access road, approximately 298 meters long (980 feet), would be constructed from the northern property boundary to the proposed turbine location (Figure 3-1). No other new access roads would be required for construction, operation, and eventual decommissioning of the turbine at the proposed location.

Libman has committed to repair any roads or other infrastructure damaged by construction or maintenance in accordance with the City Roads Agreement (as required by the WECS Ordinance), and agreements, if any, approved by each Township and the County. Libman would provide the City with copies of any licenses or easements pertaining to Libman's access from roads to the Property which pass over or through privately owned land. Any road or bridge damage caused by the transport of the turbine equipment, as determined by the process set forth in the City Road Agreements, must be repaired per the terms of that Agreement. Furthermore, Libman would provide security to insure that costs for future repairs to roads are completed to the commercially reasonable satisfaction of the unit of local government as outlined and in the amount determined by the Agreements. Any necessary road closures would be temporary and would only apply to the roads immediately surrounding the project site.

During the active construction phase of the project, which is anticipated to last approximately five months, a temporary increase in the number and frequency of vehicles on the local roads surrounding the project site is anticipated. An Oversize/Overweight Vehicle permit would be obtained by the transporting company before delivery of Oversize/Overweight materials and/or equipment to the proposed site. No long-term or permanent impacts to the local transportation systems would occur as a result of this project.

3.2.2.9 Socioeconomic and Environmental Justice

The population in Arcola, Illinois in 2000 was approximately 2,652 people (U.S. Census Bureau, 2000). 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 racial makeup of the City of Arcola in 2000 was 89.4 percent White, 0.3 percent African American, 1.1 percent Hispanic and remaining as other races. The median income for a household in the City of Arcola in 2000 was $38,125 compared to $50,046 for the United States. About 15 percent of families and 98 percent of individuals were below the poverty line in 2000 (U.S. Census Bureau, 2000).

DOE reviewed *Economic Impact, Wind Energy Development in Illinois* by the Center for Renewable Energy at Illinois State University (2010). This economic analysis monitored the economic impacts of 21 projects in Illinois which account for 1,847.76 MW of wind generating capacity in the state of Illinois. According to this analysis, these 21 projects:

- Created approximately 9,968 full-time equivalent jobs during construction periods with a total payroll of over $509 million;
- Support approximately 494 permanent jobs in rural Illinois areas with a total annual payroll of over $25 million;

- Support local economies by generating $18 million in annual property taxes;
- Generate $8.3 million annually in extra income for Illinois landowners who lease their land to the wind farm developer; and
- Will generate a total economic benefit of $3.2 billion over the life of the projects.

Direct and Indirect Effects

The job creation impact of the project was calculated using the results of an extensive report titled *Economic Impact, Wind Energy Development in Illinois* dated June 2010 and developed by the Center for Renewable Energy at Illinois State University (2010). The report cites that an average of 5.39 construction jobs and 0.26 permanent jobs are created per each installed megawatt. Smaller projects have double that effect because of a similar amount of work required for a project and fewer MWs over which to spread any effect. Libman's Proposed Project is expected to generate up to 8 jobs during the selection, evaluation, and construction phase of the project. Construction of the Proposed Project would create 8 temporary jobs, and the project is expected to retain one permanent position during the operation and maintenance phase of the project. The temporary construction jobs would last approximately 12 months and would not contribute to a population increase in the area. The area's public and community services such as schools, health care, social services and fire protection would not be affected by the Proposed Project. No residences, businesses or industries would be negatively affected or relocated as a result of the Proposed Project. The additional permanent job would provide a limited benefit to the local economy.

No potential high and adverse impacts to human health or environmental effects have been identified in this EA. There would, therefore, be no disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

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, 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 and one for particulates with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers. According to the US EPA's online air quality maps and monitoring data (http://www.epa.gov/oar/data/), Douglas County is in attainment for all pollutants listed above.

The EPA has found that the "aggregate group of the well-mixed greenhouse gases (GHG)" constitutes an air pollutant that contributes to climate change. Carbon dioxide is a GHG, and the Libman wind turbine would have an indirect impact on reducing carbon dioxide emissions from fossil fuel sources.

Electricity for Libman is currently supplied by Ameren Energy. Ameren Energy generates electricity and also purchases electricity from other utilities. Fuels sources for this energy include coal (85 percent), nuclear (13 percent), natural gas (1 percent), hydroelectric (1 percent), and oil (<1 percent) (Ameren 2007). Therefore, fossil fuels are currently the primary electricity source for Libman. Thus, carbon dioxide emissions from electricity generation to serve the Libman facility would remain the same under the No-Action alternative and Libman would not meet its objective to reduce its carbon footprint.

Direct and Indirect Impacts

The Proposed Project would be an emissions-free 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.

Carbon dioxide is a GHG that contributes to climate change, which in turn causes harm to many physical and biological systems. The Proposed Project would reduce Libman's carbon footprint by reducing reliance on fossil fuels. It is assumed if this wind energy project was not built,

Libman would continue to receive the vast majority of the electricity used by their facility from fossil-fuel sources. The annual energy capture associated with the installation of a 1.5 MW Libman wind turbine is anticipated to be upwards of approximately 4,033,980 kilowatt (kW)-hours per year (Attachment D-20). The project carbon reduction is calculated as follows:

87 percent fossil fuel use × 2.0562 lb of CO_2/kilowatt-hour × 4,033,980 kW-hour/year = 7,216,362 lbs of CO_2/year or 3,608 short tons of CO_2/year or 3,273 metric tons of CO_2/year or 3,222 long tons of CO_2/year.

The Proposed Project would reduce Libman's carbon footprint by 7,216,362 lbs of CO_2/year, thereby reducing the reliance on fossil fuel generated electricity.

3.2.2.11 Utilities and Energy

The proposed wind energy project would have a nameplate capacity of 1.5 MW and is anticipated to offset approximately 4,200 MWh/year of electrical load; with the current electrical load for Libman averaging 14,000 MWh/year. This represents approximately 30 percent of Libman's demand over an average year. The proposed renewable energy project would produce a substantial amount of clean electricity for the 20-year design life of the project.

The term electromagnetic fields refer to electric and magnetic fields that are present around any electrical device. Electric fields arise from the voltage or electrical charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, collector lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors (wire). Electromagnetic fields can occur indoors and outdoors. While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields potentially can cause biological responses or even health effects continues to be the subject of research and debate.

The National Telecommunications and Information Agency (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 Interdepartment Radio Advisory Committee for review and comment on whether the Proposed Project could potentially interfere with Federal radio communication links.

Direct and Indirect Effects

No adverse energy impacts would result for the project. The proposed renewable energy project would produce clean electricity for the 20-year design life of the project and would assist in reducing the Libman’s carbon footprint.

On July 2, 2010, the NTIA was notified of the proposed Wind Energy Project (Appendix C-4). The project was reviewed by members of the Interdepartment Radio Advisory Committee and on August 25, 2010, the NTIA responded to DOE indicating that no Federal agencies identified any concerns regarding the blockage of their radio frequency transmissions (Appendix C-4). Since this determination was made Libman, has further refined the proposed location of the wind turbine as described above. This updated location is the location analyzed within this EA; the Proposed Project would be constructed approximately 152 meters (500 feet) south of the previous location in which the NTIA’s conclusion was applicable. However, due to the minimal change in distance, and after reviewing the Microwave Beam Path Study (Appendix D-10), DOE anticipates that the Proposed Project would not interfere with radio frequency transmissions. Should a Federal agency or private entity identify concerns with the Proposed Project, Libman would work directly with the party to address those concerns.

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 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 Existing 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, online research was conducted and local planning departments and local chapters of the Chamber of Commerce were consulted via phone and email to determine current and future development projects in proximity to the Libman wind turbine location. No pending or planned projects were identified within the area to be affected by the turbine's land use, visual, 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 to biological resources, i.e., migratory birds and bats, and threatened and endangered species. DOE has identified the following wind turbine projects that are within a 60 miles radius of the site. Review of the April 2007 USFWS Indiana bat (*Myotis sodalis*) Draft Recovery Plan (USFWS 2007) indicates that that the Indiana bat typically migrates less than 60 miles, though greater distances up to 357 miles have been documented. Based on this review, DOE has determined that a 60 mile radius is appropriate for evaluating the potential for cumulative impacts to migrating individuals.

According to the USFWS's map of Fall and Spring Migratory Bird Information (Appendix A-Figures 13 and 14), the closest know migratory corridor for raptors (fall migration) to the Proposed Project is the Wabash River, located 77 kilometers (48 miles) to the east. DOE has reviewed this information and determined that the 60 mile radius as established above is more inclusive and therefore it best represents the cumulative impact area of the Libman proposed wind turbine.

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

<u>Completed</u>
Richland Community College (Macon County)
35.32 Miles W
0.1 MW, 1 turbine

Twin Groves Wind Farm I (McLean County)
52.73 Miles NW
198 MW, 120 units

Twin Groves Wind Farm II (McLean County)
54.82 Miles NW
198 MW, 120 units

Proposed
Kansas Wind Farm/Donica Creek Wind Farm (Edgar County)
20.77 Miles SE
102 .6 MW, 57 units

Broadlands Wind Farm I (Vermilion, Champaign, Edgar and Douglas Counties)
32.27 Miles N
200 MW, units unknown

Broadlands Wind Farm II (Vermilion, Champaign and Douglas Counties)
32.39 Miles N
100 MW, units unknown

Blue Ridge Wind Farm (Champaign, Piatt, and McLean Counties)
34.12 Miles N
150 MW, units unknown

EcoMill Wind Farm (Vermilion and Edgar Counties)
34.38 Miles NE
200 MW, 134 units

California Ridge Wind Farm (Vermilion and Champaign Counties)
39.51 Miles NE
200 MW, 133 units

Alta II Wind Farm (Dewitt and Logan Counties)
47.25 Miles NW
200 MW, 115 units

Alta I Wind Farm (McLean and DeWitt Counties)
54.54 Miles NW
300 MW, 163 units

Reilly Ridge Wind Farm (Vermilion County)
56.55 Miles NE
Capacity and units currently unknown

City of Arcola: Waste Water Treatment Plant
0.7 Miles SE
40kW, 1 unit

Additionally, the Sustainable Energy Plan, proposed by the Governor of Illinois in early 2005, consists of a Renewable Portfolio Standard, which requires use of renewable energy such as wind, biomass, solar, and other sources. It is expected that about 95 percent of the renewable energy generated in the state of Illinois, will come from wind by the year 2025. Approximately 3,300 wind turbines are expected to be constructed between the years 2010 and 2025, although a small subset of the 3,300 would be within 60 miles of the Proposed Project. The average size of the wind turbine installed in 2008 was 1.67 MW and in 2007 it was 1.65 MW (ISU 2010). Although it is reasonable to conclude from the Governor's plan that more wind turbines will be proposed than those listed above, their locations and timing are not reasonably foreseeable at this time.

4.2 Summary of Cumulative Effects

4.2.1 CUMULATIVE GREENHOUSE GAS IMPACTS

While the scientific understanding of climate change continues to evolve, the Intergovernmental Panel on Climate Change (IPCC) *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 GHG 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 is assumed that this wind energy project would displace fossil fuel electricity currently used by Libman, resulting in a net decrease in emissions of approximately 3,273 metric tons of carbon dioxide equivalents for each year of operation. The Proposed Project in combination with the above-listed wind turbine projects and plans for additional turbines in Illinois by 2025 would neither measurably reduce the concentration of GHGs in the atmosphere nor reduce the annual rate of GHG emissions. Rather, they would marginally 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 NOISE

Noise from the construction, operation, and eventual decommissioning of the Proposed Project would be localized and add to the noise levels in the immediate project vicinity. Other noise sources in the project vicinity include: the noise from passing vehicles on Interstate 57 and on local area roads, and noise resulting from daily operations at the Libman manufacturing facility. While the proposed turbine may add to background noise levels, these levels, even when added to noise sources from the activities listed in Section 4.1 and other local activities, would not be likely to cumulatively impact area residents or change the suburban/semi-rural nature of the area.

Based on the review of existing and reasonably foreseeable project, there are no projects within sufficient proximity or intensity to Libman's Proposed Project that would substantially impact the ambient noise levels in the area.

4.2.3 VISUAL RESOURCES

The Proposed Project would affect the viewshed in the project area. The turbine would be a dominant vertical component in the landscape based on its height and the absence of other structures or features of similar height. A similar, but smaller wind energy project is planned for the waste water treatment facility in Arcola, Illinois. No other 1.0 MW or greater wind energy projects are proposed within the vicinity of the Libman Project. Therefore, there would be minimal cumulative visual impact from the Proposed Project.

4.2.4 BIOLOGICAL RESOURCES

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 Douglas County (http://www.fws.gov/midwest/endangered/lists/illinois-spp.html). The closest known location of an Indiana bat maternal colony and critical habitat is the Blackball Mine, which is approximately 120 miles (193 km) to the north/northwest of the Proposed Project site.

Although some recent studies have shown that Indiana bat may migrate to hibernaculum up to 357 miles, the Indiana Bat Draft Recovery Plan (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 MW) and the other reasonably foreseeable projects (estimated to be greater than 900 turbines/1,152 MW) 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 a single turbine, which would provide only a small increment to any potential cumulative impact. Additionally, the 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.

There are no known major migration corridors according to the USFWS's map of Fall and Spring Migratory Bird Information (Figure 13 and 14), no Audubon Important Bird Areas (IBAs) (Cecil 2009) and no known other areas of high bird concentration or use in close proximity to the project area. Given the distance from the Wabash River (77 kilometers/48 miles), the nearest known migratory route to the Proposed Project location, the impacts to migrating birds is unlikely as the project area does not have sufficient stop-over habitat for traveling individuals. Therefore, it is unlikely that the proposed single-turbine project would contribute to any potential cumulative impacts posed by the larger turbine capacity in the area.

There are no other substantial significant cumulative impacts on the environment that are reasonably foreseeable.

5. 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.

These resource impacts are considered impacts to non-renewable resources. For the Proposed Project, most resource commitments are neither irreversible nor irretrievable and are considered short-term and temporary.

Specifically, resources consumed during construction of the project, including labor, fossil fuels and construction materials, would be committed for the life of the project. Non-renewable fossil fuels would be irretrievably lost through the use of gasoline and diesel powered construction equipment during construction. Approximately 0.32 hectare (0.78 acre (34,100 square feet)) of land would be irreversibly committed during the functional life of the project.

The expenditure of ARRA funding from DOE would also be irreversible

6. UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts associated with the Proposed Project include:

- Long-term loss of approximately 0.32 hectare (0.78 acre (34,100 square feet)) of vegetation resulting from the construction of the tower foundation;
- An increase in noise levels during construction and operation;
- Introduction of a dominant vertical element into the existing viewshed;
- Shadow flicker impacts to residences that share property boundaries with the Libman project; and
- A low risk of harm resulting from tower collapse, blade failure and ice throw.

In the case of the construction noise, this impact would be temporary. The loss of vegetation, visual and shadow flicker impacts, operation noise and risk of tower collapse would be long term impacts. Overall, impacts of the Proposed Project on the environment and human health are not considered significant as described in the relevant sections in Chapter 3.

7. REFERENCES

Ameren. 2007. 2007 Environmental Report. Stewardship: Balancing the Needs of Our Environment, Our Customers, and Our Economy.

Arcola (City of Arcola) 2007. "City of Arcola, Illinois – Zoning, TIF and City Limits Map 2007." [Available online at: http://www.arcolaillinois.org]. Accessed October 29, 2010.

AWEA (American Wind Energy Association) 2009. Wind Energy Fact Sheet - Utility Scale Wind Energy and Sound [Available online at: http://www.awea.org/pubs/factsheets/Utility_Scale_Wind_Energy_Sound.pdf]. Accessed August, 2010.

Arnett, E.B.; Brown, W.K.; Erickson, W.P.; Fiedler, J.K.; Hamilton, B.L.; Henry, T.H.; Jain, A.; Johnson, G.D.; Kerns, J.; Koford, R.R.; Nicholson, C.P.; O'Connell, T.J.; Piorkowski, M.D.; and Tankersley, R.D. Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management* 72 (1):61-78; 2008.

Australia NHMRC (Australia National Health and Medical Research Council) 2010. *Wind Turbines and Health – A Rapid Review of the Evidence, July 2010.* [Available online at: http://www.nhmrc.gov.au/publications/synopses/new0048.htm]. Accessed on September 8, 2010).

BCI (Bat Conservation International, Inc.) 2010. Species Profiles. [Available online at: http://www.batcon.org/index.php/all-about-bats/species-profiles.html]. Accessed November 2, 2010.

BHE Environmental, 2010. Post-construction bird and bat mortality study Cedar Ridge wind farm Fond du Lac County, Wisconsin. Interim Report prepared for Wisconsin Power and Light and submitted to Wisconsin Public Service Commission.

BLM (Bureau of Land Management) 2005a. "Chapter 4. Affected Environment." *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States*. FES -5-11. June 2005. U.S. Department of the Interior, Bureau of Land Management.

BLM (Bureau of Land Management) 2005b. "Chapter 5. Potential Impacts of Wind Energy Development and Analysis of Mitigation Measures." *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States*. FES -5-11. June 2005. U.S. Department of the Interior, Bureau of Land Management.

BLM (Bureau of Land Management) 2005c. "Chapter 3. Overview of Wind Energy Project." *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States*. FES -5-11. June 2005. U.S. Department of the Interior, Bureau of Land Management.

Bogdan, J. 2009. Responsibility for Toppled Turbine Cloudy. The Observer-Dispatcher. December 28. [Available online at http://www.uticaodcom/news/x1437795639/Responsibility-for-toppled-turbine-cloudy.] Accessed on November 2, 2010.

Branham, M (Illinois Department of Natural Resources, Division of Ecosystems and Environment). 2010. Personal communication re: consultation for Endangered Species Protection and Natural Areas Preservation (Part 1075). [Letter sent to Alyson Grady, Illinois Department of Commerce and economic Opportunity.]

Cecil, J.; Sanches, C.; Stenhouse, I.; and Hartzler, I. 2009. Important Bird Areas Americas, United States of America. Birdlife Conservation Series 16; 2009. [Available online at: http://www.birdlife.info/docs/AmCntryPDFs/USA.pdf]. Accessed November 2, 2010.

Center for Renewable Energy at Illinois State University. 2010. "Economic Impact, Wind Energy Development in Illinois". [Available online at: http://renewableenergy.illinoisstate.edu/wind/publications/2010%20FINAL%20NEW%20Economic%20Impact%20Report.pdf.pdf]. Accessed November 2, 2010.

Colby, W.D.; Dobie, R.; Leventhall, G.; Lipscomb, D.M.; McCunney, R.J.; Seilo, M.T.; and Søndergaard, B. 2009. *Wind Turbine Sound and Health Effects: An Expert Panel Review*. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. [Available online at: http://www.awea.org/newsroom/releases/AWEA_CanWEA_SoundWhitePaper_12-11-09.pdfhttp://www.awea.org/newsroom/releases/AWEA_CanWEA_SoundWhitePaper_12-11-09.pdf]. Accessed August 24, 2010.

Cryan, P. 2008. *Overview of Issues Related to Bats and Wind Energy*. Presentation to the Wind Turbine Guidelines Advisory Committee Technical Workshop & Federal Advisory Committee Meeting, Washington, D.C., 26 February, 2008: U.S. Geological Survey General Information Product. 71 pp.

DWIA (Danish Wind Industry Association) 2003. "Shadow Casting from Wind Turbines." [Available online at: http://guidedtour.windpower.org/en/tour/env/shadow/index.htm]. Accessed March 19, 2010.

DSIRE (Database of State Incentives for Renewables & Efficiency) 2010. Illinois Incentives/Policies for Renewables & Efficiency. [Available online at: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL13R]. Accessed November 8, 2010.

Drake, D.J. Garvin, S. Grodsky, and M. Watt. 2010. Post-construction bird and bat monitoring at the Forward Energy Center Second Interim Report. Interim Report prepared for Forward Energy LLC and submitted to the Wisconsin Public Service Commission.

DOE (U.S. Department of Energy) 2006. Memorandum. Office of NEPA Policy and Compliance. Need to Consider Intentional Destruction Acts in NEPA Documents. December 1, 2006.

DOE (U.S. Department of Energy) 2009. Memorandum. Office of the Assistant Secretary Energy Efficiency and Renewable Energy. Memorandum from EERE Regarding Delegation of Authority for Section 106 Review of Undertakings, Assisted by the U. S. Department of Energy, Office of Energy Efficiency and Renewable Energy. August 28, 2009.

DOI (Department of the Interior) 2010. National Rivers Inventory, Illinois Segments. [Available online at: http://www.nps.gov/ncrc/programs/rtca/nri/states/il.html]. Accessed November 2, 2010.

EPA (U.S. Environmental Protection Agency) 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* 550-/9-74-004, March 1974. U.S. Environmental Protection Agency, Office of Noise Abatement and Control.

EPA (U.S. Environmental Protection Agency) 1977. *Toward a National Strategy for Noise Control*. U.S Environmental Protection Agency, Office of Noise Abatement and Control.

Epilepsy Foundation (American Epilepsy Foundation) n.d. "Photosensitivity and Epilepsy, Photosensitivity and Seizures." [Available online at: http://www.epilepsyfoundation.org/about/photosensitivity]. Accessed March 20, 2010.

Federal Aviation Administration (FAA). 2007. Advisory circular70/7460-1 K. February 1, 2007.

Federal Emergency Management Agency (FEMA). 2005. Flood Insurance Rate Map, Normal, IL. Effective date: April 19, 2005. [Available online at: https://hazards.fema.gov/wps/portal/mapviewer]. Accessed November 2, 2010.

Global Energy Concepts, 2005. Public Health and Safety. NYS Energy Research and Development Authority. [Available online at: http://www.powernaturally.org/programs/wind/toolkit/18_publichealthandsafety.pdf]. Accessed November 2, 2010.

Gruver, J., M Sonnenburg, K. Bay, and W. Erickson. 2009. Post-construction bat and bird fatality study at the Blue Sky Green Field Wind Energy Center, Fond du Lac County, Wisconsin. Final Report submitted to the Wisconsin Public Service Commission by WEST, Inc.

Harding, G.; Harding, P.; and Wilkins, A., 2008. "Wind turbines, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them." *Epilepsia*, 49(6): 1095-1098.

HUD (Department of Housing and Urban Development) 2009. *The Noise Guidebook*. United States Department of Housing and Urban Development. Washington, D.C.Illinois Endangered Species Protection Board. 2009. Species Recovery Success Story: Bald eagle (*Haliaeetus leucocephalus*) Proposed for Delisting in 2009. Springfield, Illinois.

INHD (Illinois Natural Heritage Database). 2010. Illinois Threatened and Endangered Species by County as of February 2010. [Available online at: http://dnr.state.il.us/conservation/naturalheritage/pdfs/et_by_co_feb2010.pdf]. Accessed November 2, 2010.

INHS (Illinois Natural History Survey) 2005. Illinois Gap Analysis Project: Mammals. [Available online at: http://www.inhs.uiuc.edu/cwe/gap/whr_mammals.htm]. Accessed November 2, 2010.

INHS (Illinois Natural History Survey) 2009. Illinois Natural Resources Information Network. [Available online at: http://www.inhs.illinois.edu/animals_plants/birds/ifwis/birds/]. Accessed November 2, 2010.

IPCC (Intergovernmental Panel on Climate Change) 2007. *IPCC Fourth Assessment Report: Climate Change 2007 (AR4).* http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm#1

Illinois Raptor Center. [Available online at: http://www.illinoisraptorcenter.org]. Accessed November 2, 2010.

Illinois State Geological Survey (ISGS). 2009. Quaternary Deposits. ISGS 8.5x11 Map Series. [Available online at: http://www.isgs.illinois.edu/maps-data-pub/publications/pdf-files/quaternary-deposits-8x11.pdf]. Accessed May 19 2010.

ISGS 1995. Earthquake Facts (1995-3). Earthquake Occurrence in Illinois [Available online at: http://www.isgs.illinois.edu/research/earthquake-hazards/pdf-files/qk-fct-occur.pdf]. Accessed on November 2, 2010.

Macqueen, J. F., J. F. Ainsilie, et al. (1983). "Risks associated with wind-turbine blade failures." IEE Proceedings 130, Part A(9): pp. 574-586.

NWCC (National Wind Coordinating Committee) 2006. *Proceedings of the NWCC Siting Technical Meeting. Washington, D.C. December 1-2, 2005*. Prepared by Susan Savitt Schwartz, ed. March 2006. Meeting planned by the NWCC Siting Workgroup. Meeting facilitated by National Wind Coordinating Committee Staff c/o RESOLVE, Inc., Washington D.C.

Ontario CMOH (Ontario Chief Medical Officer of Health) 2010. *The Potential Health Impact of Wind Turbines*. Chief Medical Officer of Health Report, May 2010. [Available online at: http://www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.aspx]. Accessed on September 8, 2010.

Punch, Jerry et al. (2010). *Wind-Turbine Noise What Audiologists Should Know*. Audiology Today. July/August 2010.

Rogers, Anthony L., Ph.D., 2006. *"Wind Turbine Noise, Infrasound and Noise Perception"* Renewable Energy Research Laboratory, University of Massachusetts at Amherst. January 18, 2006. [Available online at: http://www.windpoweringamerica.gov/ne_issues_sound.asp]. Accessed August 24, 2010.

Strickland, D. 2004. Non-fatality and habitat impacts on birds from wind energy development. Pages 34-38 in S.S. Schwartz (ed.). Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts. May 18-19, 2004. RESOLVE, Inc. Washington, DC. 107pp. +appendices.

Tetra Tech EC, Inc. 2007. Exhibit 14 – Wind Turbine Ice Blade Throw. [Available online at: http://www.horizonwindfarms.com/northeast-region/documents/under-dev/Arkwright/Exhibit14_IceSheddingandBladeThrowAnalysis.pdf]. Accessed November 2, 2010.

U.S. Census Bureau. 2000. [Available online at: http://www.census.gov/main/www/cen2000.html]. Accessed November 2, 2010.

U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) Soil Survey Division. 2010a. Soil Map—Douglas County, Illinois. Web Soil Survey, National Cooperative

Soil Survey. [Available online at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx]. Accessed 19 May 2010.

USDA-NRCS Soil Survey Division. 2010b. Soil Series Name Search Query Facility. National Cooperative Soil Survey. [Available online at: http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdnamequery.cgi]. Accessed 19 May 2010.

USFWS (U.S. Fish and Wildlife Service) 2003. Interim Guidelines on Avoiding and Minimizing Impacts from Wind Turbines, May 13, 2003.

USFWS (U.S. Fish and Wildlife Service) 2007. Indiana bat (Myotis sodalis) Draft Recovery Plan: First Revision. Great Lakes-Big Rivers Region - Region 3 Fort Snelling, Minnesota.

USFWS (U.S. Fish and Wildlife Service) 2009. National Wetlands Inventory. [Available online at: http://www.fws.gov/wetlands/Data/Mapper.html]. Published September 25, 2009. Accessed July 25, 2010.

USFWS (U.S. Fish and Wildlife Service) 2010. Illinois List of Federally Endangered, Threatened, Proposed, and Candidate Species-by County. [Available online at: http://www.fws.gov/midwest/endangered/lists/illinois-cty.html]. Accessed November 2, 2010.

USGS (U. S. Geological Survey) 2010. North American Breeding Bird Survey. [Available online at: http://www.mbr-pwrc.usgs.gov/cgi-bin/rtena07a.pl?34]. Accessed November 2, 2010.

Vensys (Vensys Energy AG) n.d. "Technical Details – Vensys 1.5 MW" (company brochure). [Available online at: http://www.vensys.de/index.php?id=52&L=2]. Accessed November 2, 2010.

WES Engineering, Inc. 2010a. Libman Wind Project - Wind Turbine Sound Modeling and Ambient Noise Assessment. October, 2010.

WES Engineering, Inc. 2010b. Libman Wind Shadow Flicker Study. October, 2010.

WHO (World Health Organization) 1999. *Guidelines for Community Noise*. Edited by Birgitta Berglund, Thomas Lindvall, and Dietrich H. Schwela. World Health Organization, Geneva.

8. AGENCIES AND PERSONS CONSULTED

Name	Title	Organization	Address	Phone
Cuddy, Thomas	-	Federal Aviation Administration – Office of Environment and Energy	800 Independence Ave., SW, Room 900Washington, D.C. 20591	202-493-4018
Sailor, Mathew	-	U.S. Fish and Wildlife Service	Rock Island Illinois Field Office 1511 47th Avenue Moline, Illinois 61265	309-757-5800
Henry, Joyce	-	National Telecommunications and Information Agency	JHenry@ntia.doc.gov	
Shank, Keith	-	Illinois Department of Natural Resources, Division of Ecosystem and Environment	One Natural Resources Way Springfield, IL 62702	217-785-5500
Haaker, Anne	Deputy SHPO	Illinois Historic Preservation Agency	1 Old State Capitol Plaza Springfield, IL 62702	
Wagoner, Bill	City Administrator	City of Arcola	114 North Locust Arcola City Hall PO Box 215 Arcola, IL 61910	217-268-4966
Grady, Alyson		Illinois Department of Commerce and Economic Opportunity	620 East Adams St. Springfield, IL 62701	
	Tuscola Service Center	Natural Resource Conservation Service	900 S Washington St. Tuscola, IL 61953	
Chard, Steve	Acting Chief	Illinois Department of Agriculture	Bureau of Land and Water Resources State Fairgrounds PO Box 19281 Springfield, IL 62794	

APPENDIX A: FIGURES

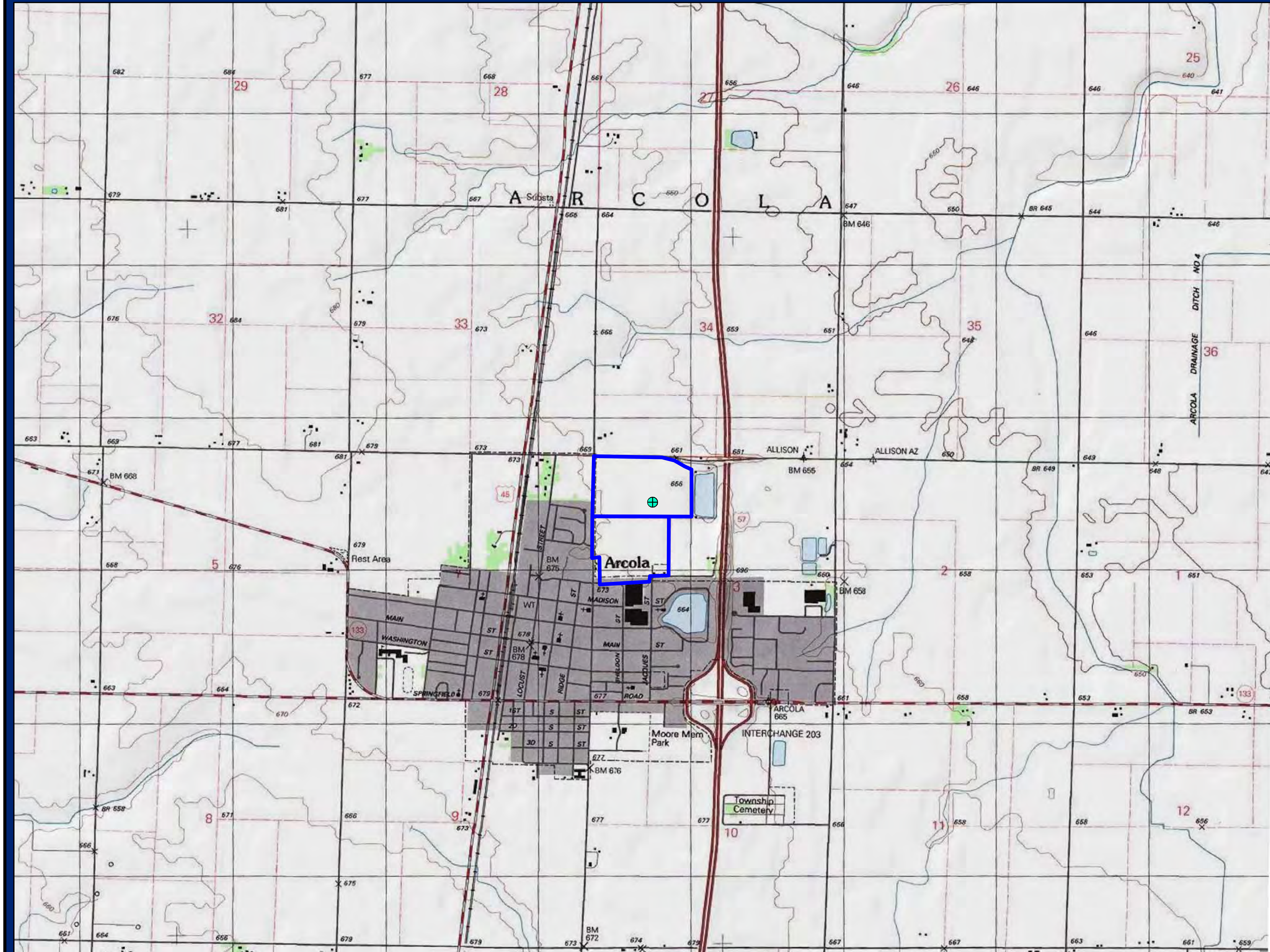
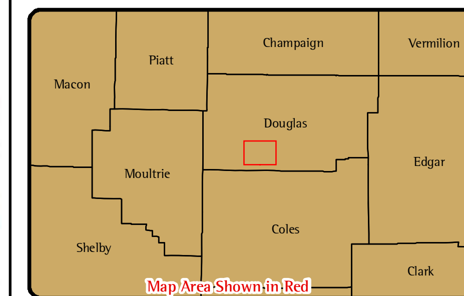


Figure 1. Project Location



Location

Section 3, T41N, R8E
Douglas County, Illinois

0 1,000 2,000 Feet

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

Legend

Parcel Outline

Proposed Turbine Location

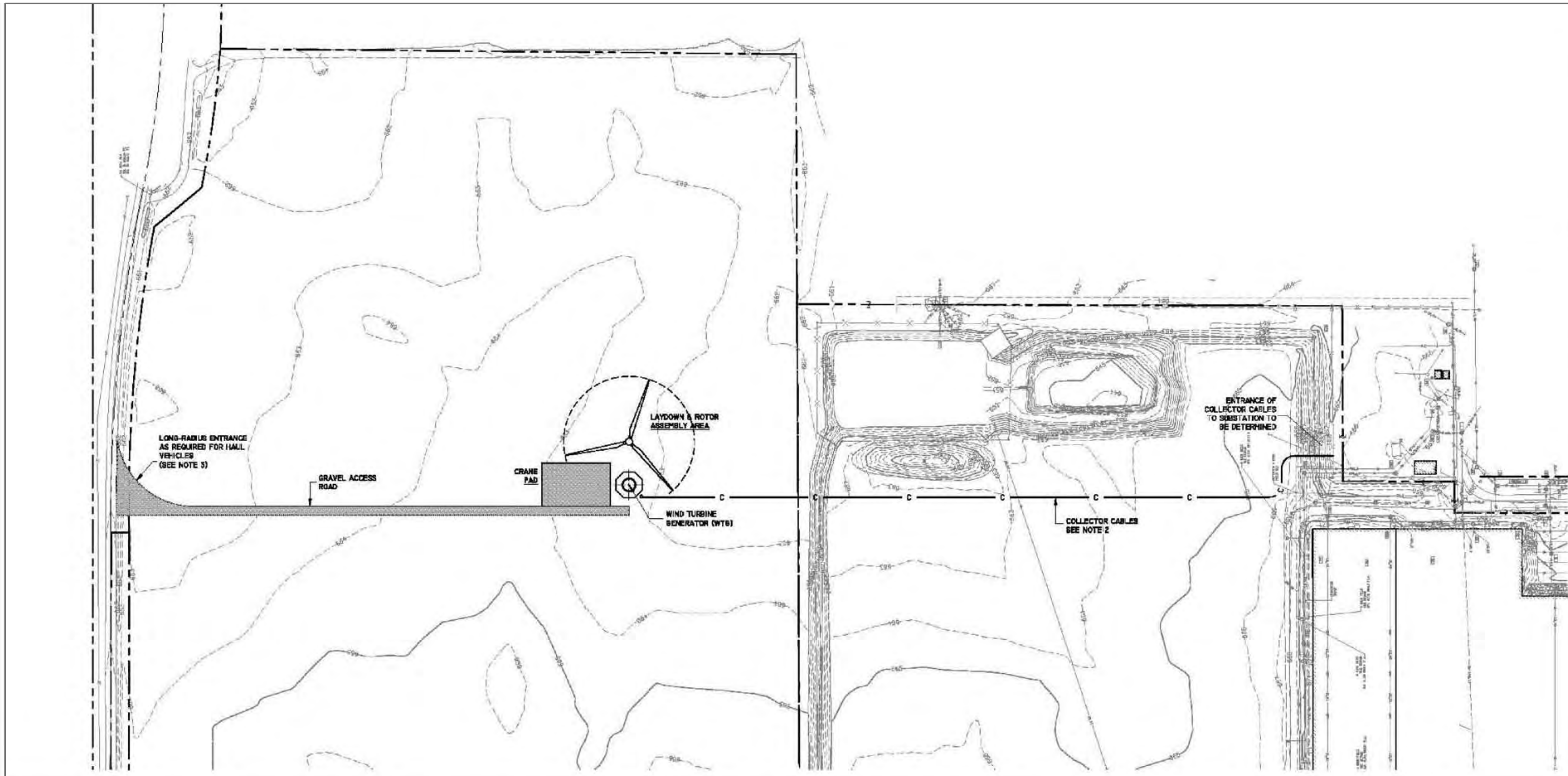
Data Sources include USGS, Wes Engineering

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Figure 1.mxd Map Created by A. Selk

Figure 2.
Project Layout



SITE PLAN

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

SHEET 2

REVISION 0

LEGEND

- PROPERTY / TITLE / R.O.W. LINE
- FENCE
- LAKE, POND, RIVER
- DRAINAGE, WETLAND
- ELECTRIC, OVERHEAD, W/ POWER POLE
- GAS LINE, UNDERGROUND
- SANITARY SEWER
- STORM SEWER OR DRAIN
- FIBER OPTIC, UNDERGROUND
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- STRUCTURE
- PROPOSED WIND TURBINE GENERATOR
- PROPOSED UNDERGOUND COLLECTOR
- PROPOSED AGGREGATE SURFACES

SOURCE OF BASE MAP

1. TOPOGRAPHIC DATA, SITE FEATURES AND PROPERTY LINES CONTAINED IN "TOPOBASE-072007.DWG" AND "5983-80.DWG", ORIGINALLY PREPARED BY BERNS, CLANCY AND ASSOCIATES, P.C., URBANA, ILLINOIS, AND PROVIDED ON 4.20.2010.
2. COORDINATE SYSTEM IS ILLINOIS STATE PLANE, EAST ZONE, NAD 83(86). VERTICAL DATUM IS NAVD 88.
3. CURRENT CONDITIONS MAY VARY FROM THOSE SHOWN ON THE BASE MAP. CONTRACTORS PERFORMING WORK AT THE SITE SHALL CONFIRM CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY OWNER OF DISCREPANCIES.

NORTH

0 50 100 200

1 INCH = 100 FEET ON 22" X 34" ORIGINAL

CONSTRUCTION COORDINATES

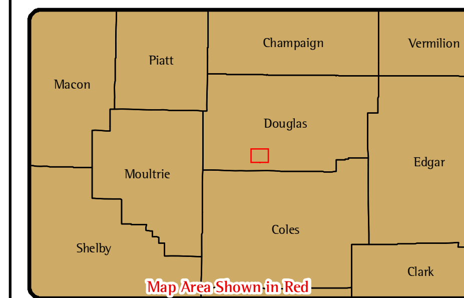
PT NO.	GEOGRAPHIC, NAD 83(86)		SPC, ILL EAST, NAD 83(86)	
	LATITUDE	LONGITUDE	NORTHING	EASTING
WTG	39° 41' 33.502"	88° 17' 50.677"	1,101,980.0	994,389.0

COORDINATE CONVERSION FROM LAT-LONG TO SPC MADE USING U.S. ARMY CORPS OF ENGINEERS SOFTWARE – CORPSCON, V. 6.0.1. N/E VALUES ROUNDED TO NEAREST 1.0 FT.

CONSTRUCTION NOTES & SPECIFICATIONS

1. GEOMETRY OF PROPOSED ACCESS ROADS, CRANE PADS AND ASSEMBLY AREAS IS BASED ON TYPICAL CRITERIA PUBLISHED BY VENSYS FOR THEIR 70 / 77 M ROTOR WTG. DOCUMENT # KRANSTELLFLACHE_31.10.2007.DOC AND ZUWEGUNG_ACCESS_ROADS.DOC, REV. A.
2. ALIGNMENT OF COLLECTOR CABLES MAY BE ADJUSTED AFTER CONFIRMING THE LOCATION OF A WATERLINE IN THIS VICINITY (CONSTRUCTED AFTER THE BASE MAP WAS SURVEYED.)
3. CULVERT CONSTRUCTION MAY BE REQUIRED IN R.O.W., DEPENDING ON LOCAL DRAINAGE CONDITIONS.

LIBMAN



Location

Section 3, T41N, R8E
Douglas County, Illinois

0 500 1,000 Feet

Project Information

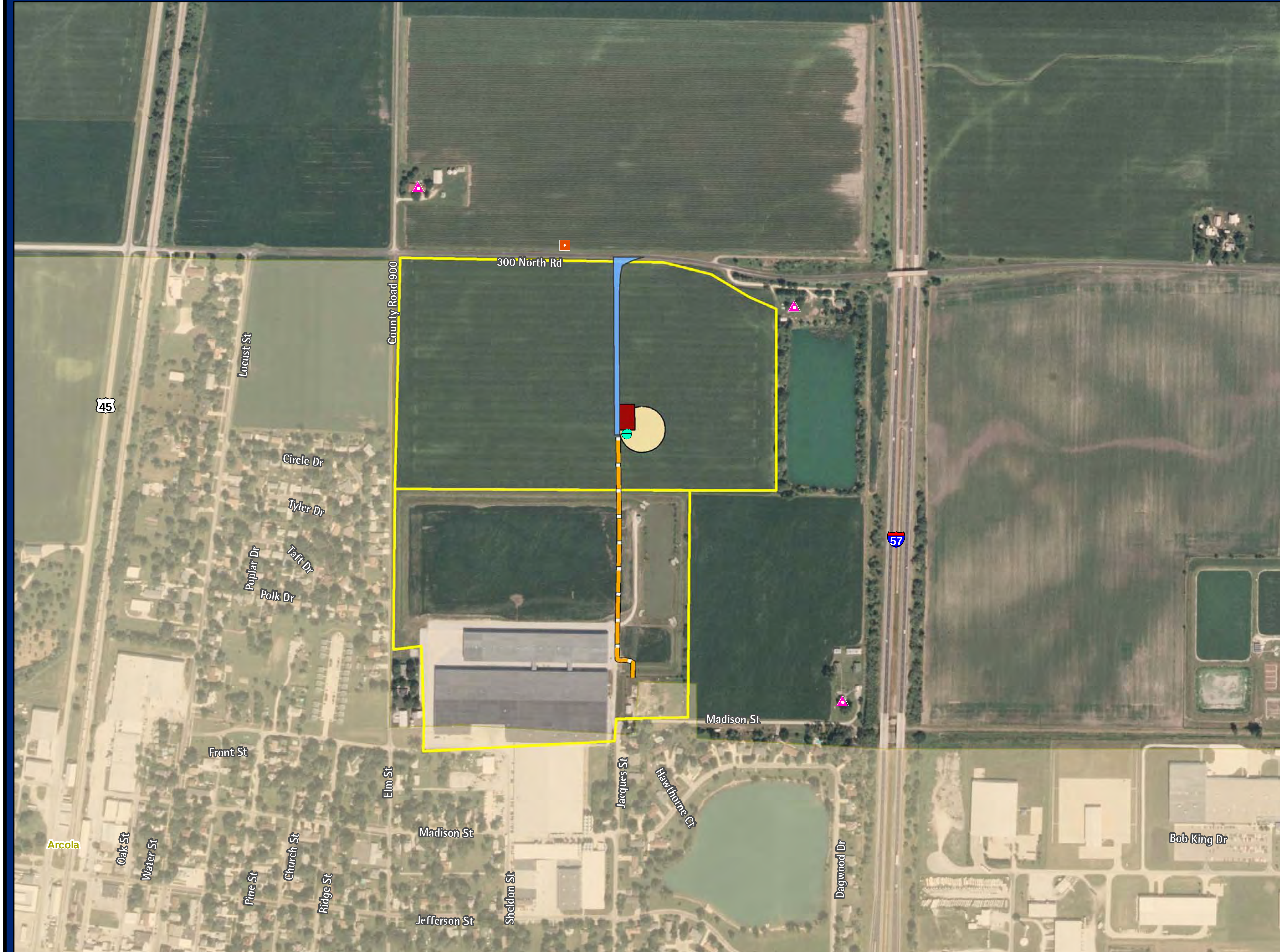
Project Number : 010-0129-01
Modified October 18, 2010

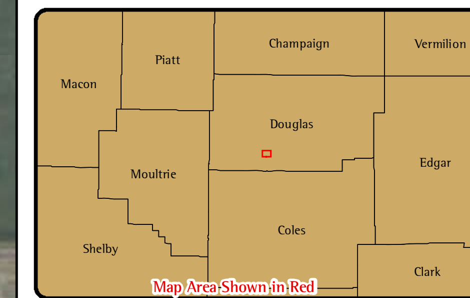
NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 2.mxd Map Created by A. Selk

Figure 3. Project Location on Area Map





Location

Section 3, T41N, R8E
Douglas County, Illinois

N

0 300 600 Feet

Project Information

Project Number : 010-0129-01
Modified November 03, 2010

Legend

- Parcel Outline
- Proposed Turbine Location
- Single-Family Homes
- Home Under Construction

Proposed Site Plan Features

- Laydown & Rotor Assembly Area
- Crane Pad
- Gravel Entrance and Access Road
- Electrical Line (approximately 10' wide)

Data Sources include IIDNR, Wes Engineering, ESRI
Imagery: 2009 NAIP

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 3.mxd Map Created by A. Selk

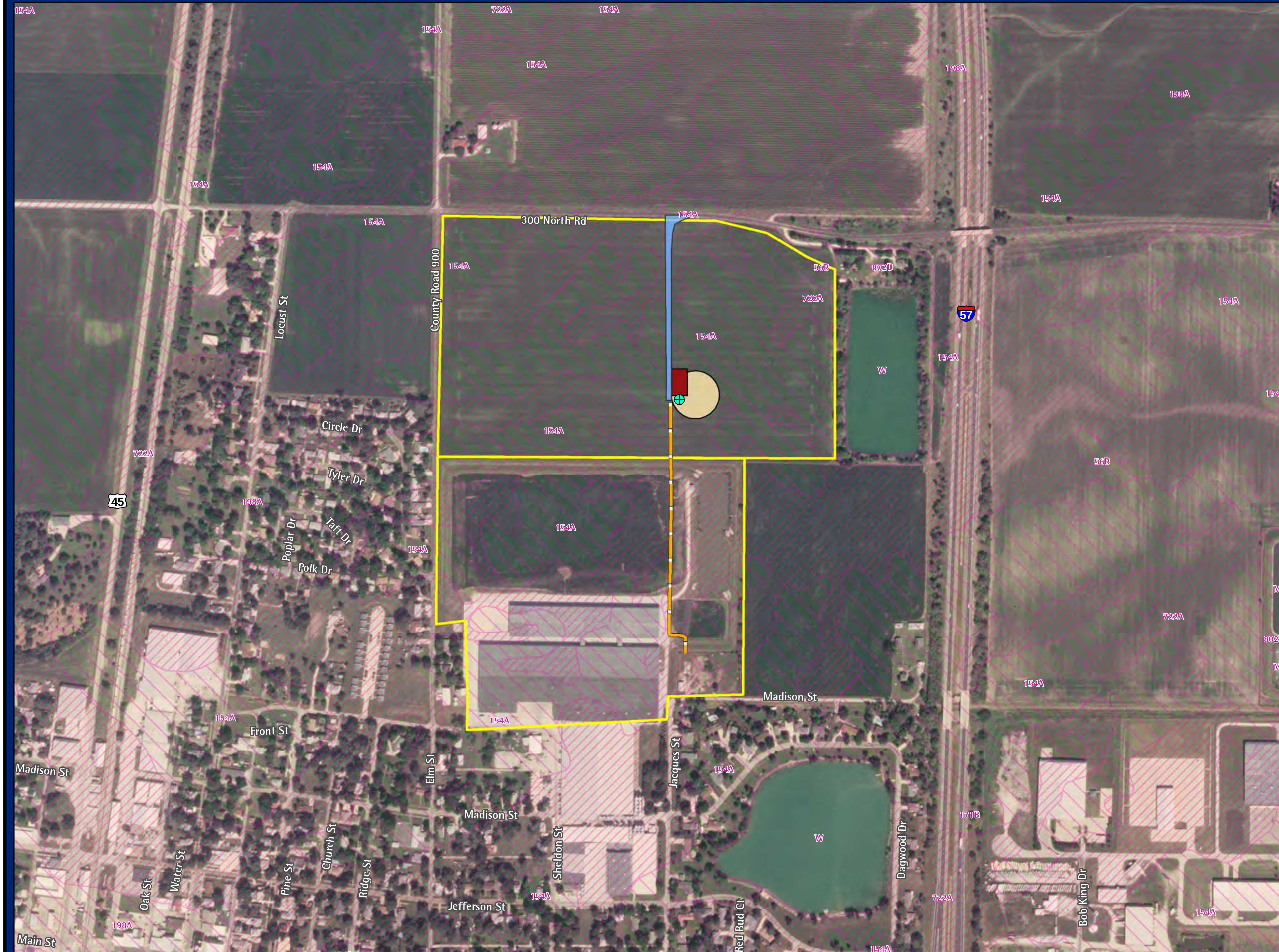
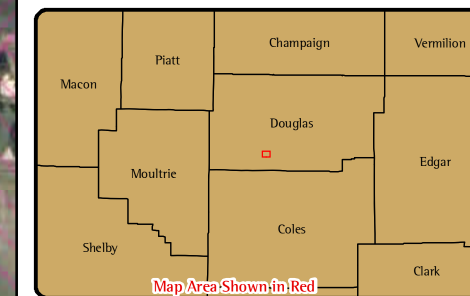


Figure 4.

Project Area Natural Resources Conservation Service Soil Data



Location

Section 3, T41N, R8E
Douglas County, Illinois

0 250 500 Feet

N

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

Legend

- Proposed Turbine Location
- Parcel Outline

Proposed Site Plan Features

- Laydown & Rotor Assembly Area
- Crane Pad
- Gravel Entrance and Access Road
- Collector Route

NRCS Hydric Soils

- Hydric Soils
- Possible Hydric Inclusions
- No Hydric Soils

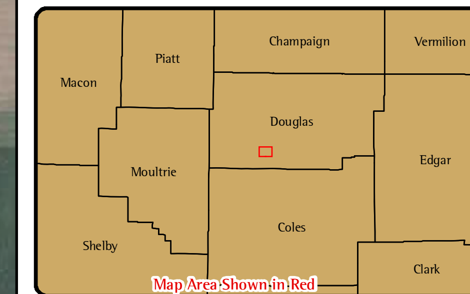
Data Sources include NRCS, Wes Engineering, ESRI
Imagery: 2009 NAIP

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 4 Soils.mxd Map Created by A. Selk

Figure 5. National Wetlands Inventory



Location
Section 3, T41N, R8E
Douglas County, Illinois

0 500 1,000 Feet

Project Information
Project Number : 010-0129-01
Modified November 01, 2010

Legend

- Parcel Outline
- Proposed Turbine Location

Proposed Site Plan Features

- Laydown & Rotor Assembly Area
- Crane Pad
- Gravel Entrance and Access Road
- Electrical Line (approximately 10' wide)
- NWI Wetlands

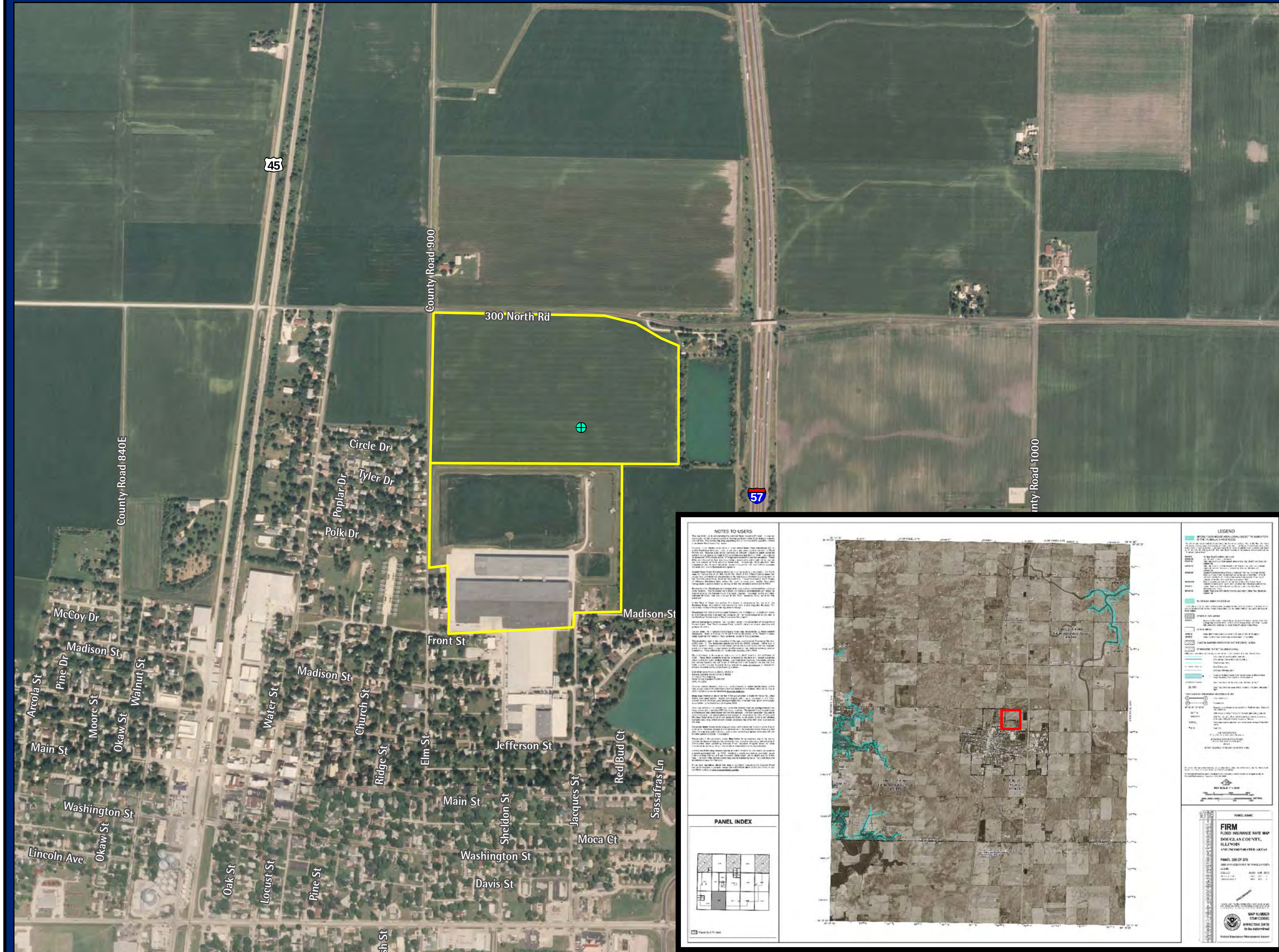
Data Sources include IDNR, USGS, Wes Engineering, ESRI
Imagery: 2009 NAIP

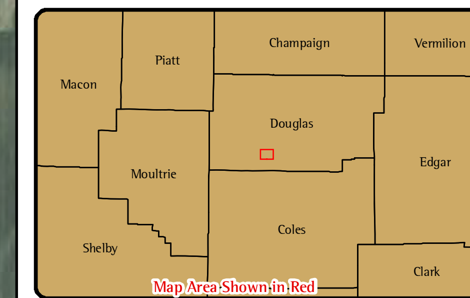
NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 5 NWI.mxd Map Created by A. Selk

Figure 6.
FEMA Floodplain Data





Location
Section 3, T41N, R8E
Douglas County, Illinois

0 500 1,000 Feet

Project Information
Project Number : 010-0129-01
Modified November 01, 2010

Legend

- Proposed Turbine Location
- Parcel Outline
- FEMA Flood Zones*

** No Flood Zones located within map extent*

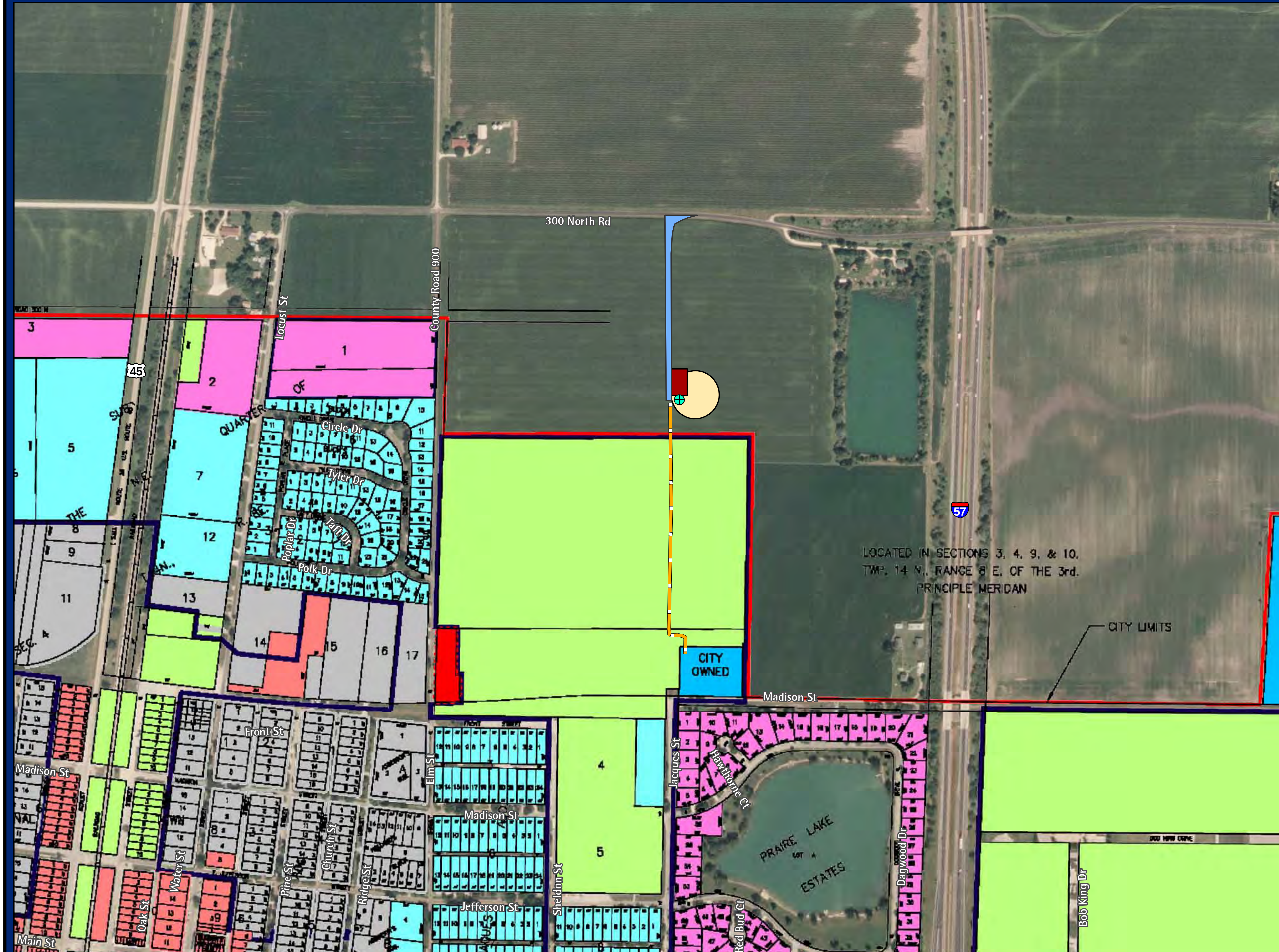
Data Sources include IIDNR, FEMA, Wes Engineering, ESRI
Imagery: 2009 NAIP

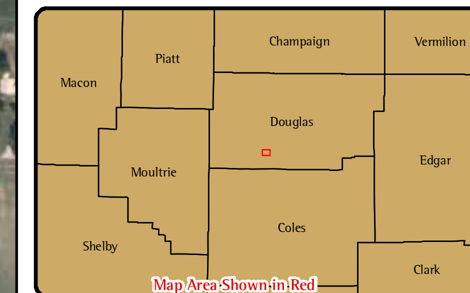
NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 6 FEMA.mxd Map Created by A. Selk

Figure 7.
Project Location on City of Arcola Zoning Map





Location

Section 3, T41N, R8E
Douglas County, Illinois

0 250 500 Feet

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

Legend

Proposed Turbine Location

Proposed Site Plan Features
- Laydown & Rotor Assembly Area
- Crane Pad
- Gravel Entrance and Access Road
- Collector Route

Arcola Zoning Data*
- R-D Rural Development
- R-1 Low Density Single Family
- R-2 High Density Single Family
- R-3 Mobile Homes
- R-4 Multi Family
- B-1 General Commercial
- B-2 Highway Commercial
- IN. Industrial

* Data from Clark Dietz Zoning, TIF and City Limits Map 2007

Data Sources include IIDNR,Wes Engineering, ESRI
Imagery: 2009 NAIP

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 7.mxd Map Created by A. Selk

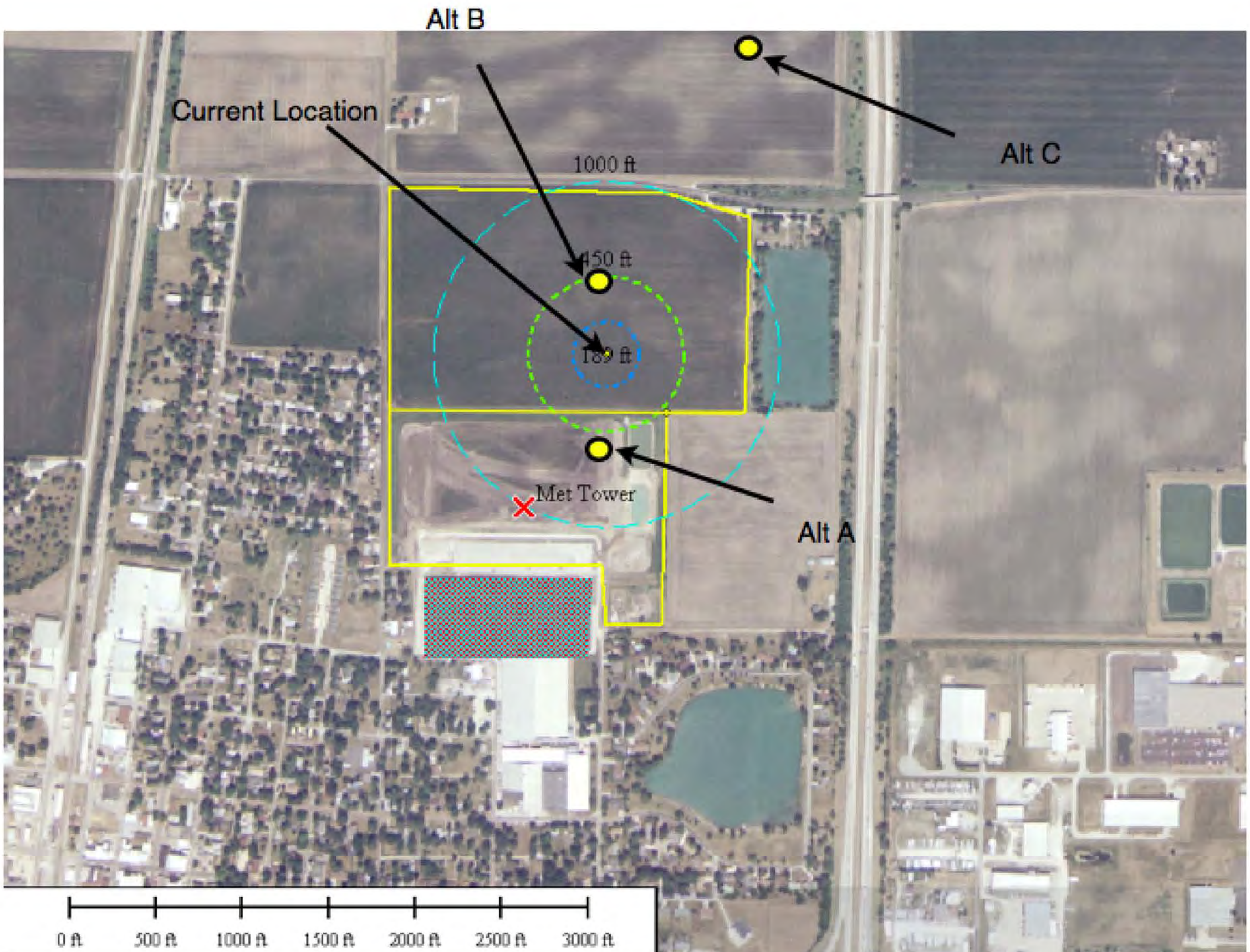
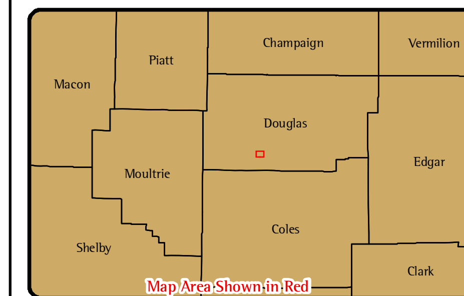


Figure 8.
Wind Energy Alternatives Locations Evaluated



Location

Section 3, T41N, R8E
Douglas County, Illinois

N

0 250 500 Feet

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

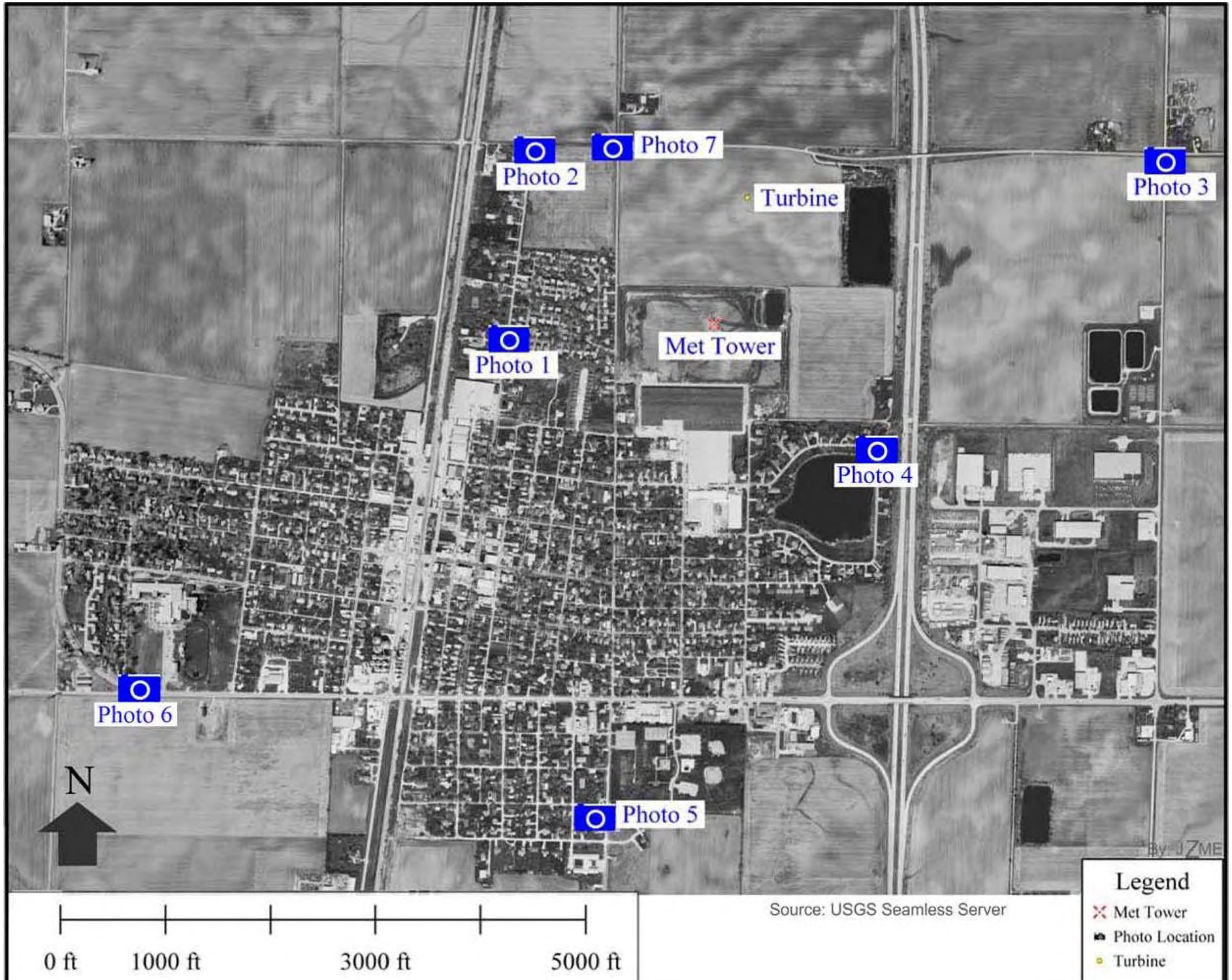
Data Sources include Wes Engineering, ESRI

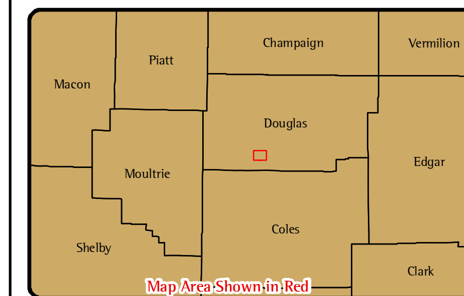
NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 8.mxd Map Created by A. Selk

Figure 9.
Libman Wind Energy Project
Photo Simulation Locations





Location

Section 3, T41N, R8E
Douglas County, Illinois

0 500 1,000 Feet

Project Information

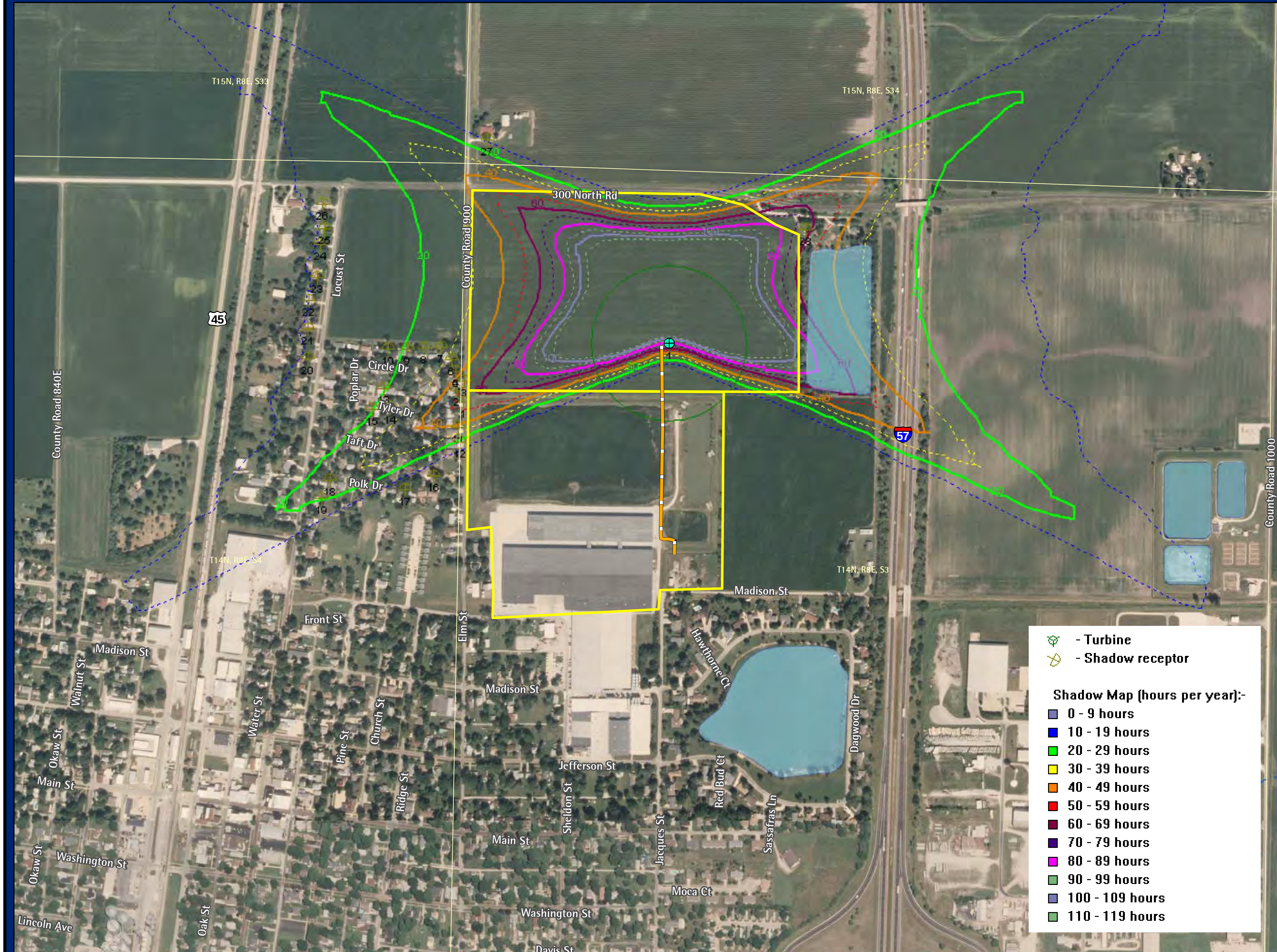
Project Number : 010-0129-01
Modified November 1, 2010

Data Sources include Wes Engineering, ESRI

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Figure 10.
Libman Wind Energy Project
Shadow Flicker Modeling



Macon, Platt, Champaign, Vermilion, Douglas, Moultrie, Edgar, Coles, Shelby, Clark

Map Area Shown in Red

Location

Section 3, T41N, R8E
Douglas County, Illinois

0 250 500 Feet

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

Legend

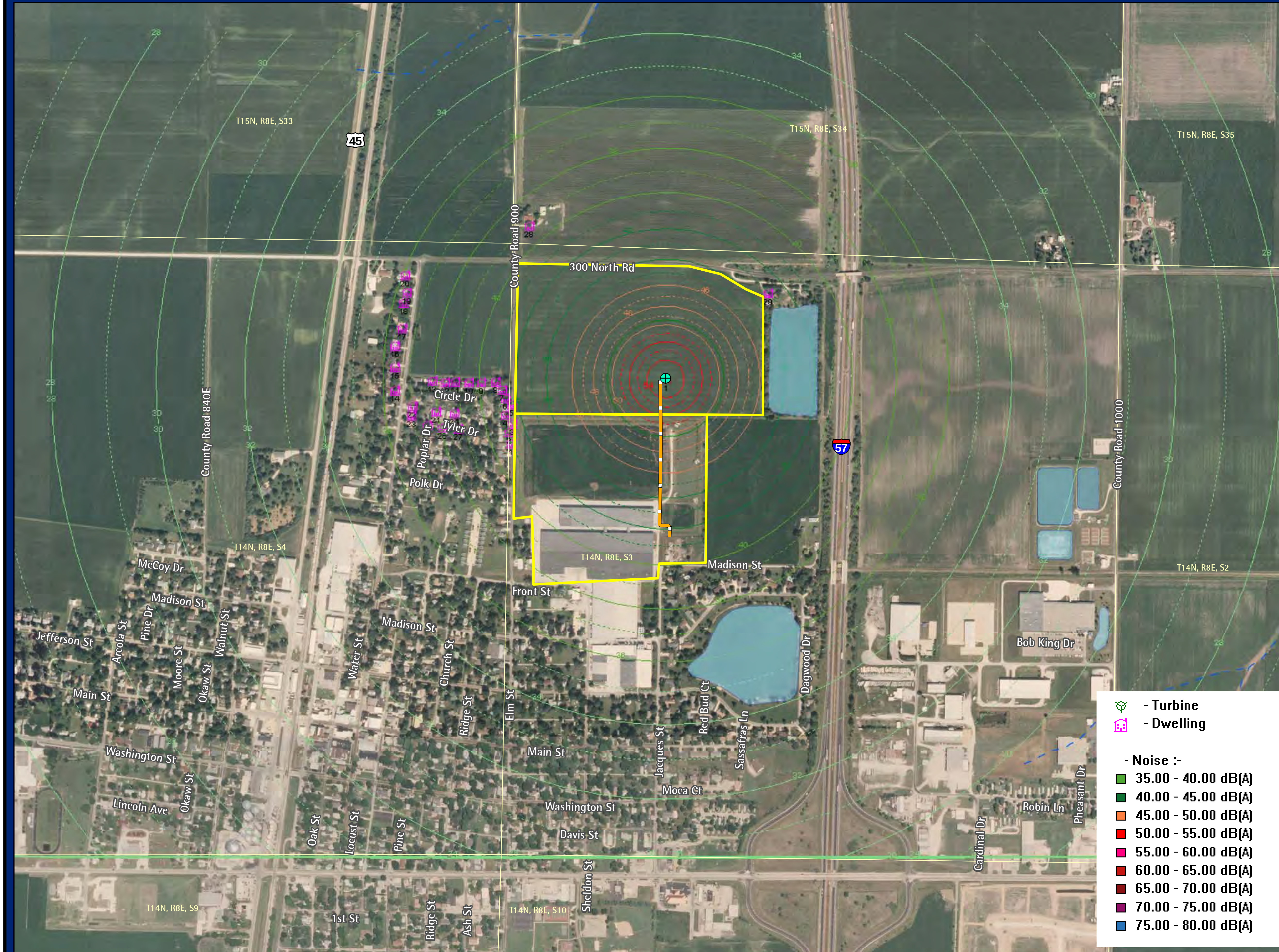
- Proposed Turbine Location
- Parcel Outline
- Collector Route

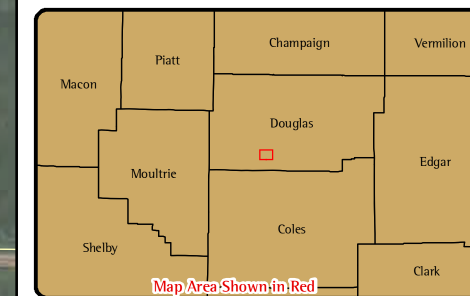
Data Sources include Wes Engineering, ESRI
Imagery: 2009 NAIP

NRC Natural Resources Consulting, Inc. now Stantec
209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 10 Shadow Flicker.mxd Map Created by A. Selk

Figure 11.
Libman Wind Energy Project Sound Pressure Level Contour Map





Location

Section 3, T41N, R8E
Douglas County, Illinois

0 300 600 Feet

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

Legend

- Proposed Turbine Location
- Parcel Outline
- Collector Route

Data Sources include Wes Engineering, ESRI
Imagery: 2009 NAIP

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 11 Noise Study.mxd Map Created by A. Selk

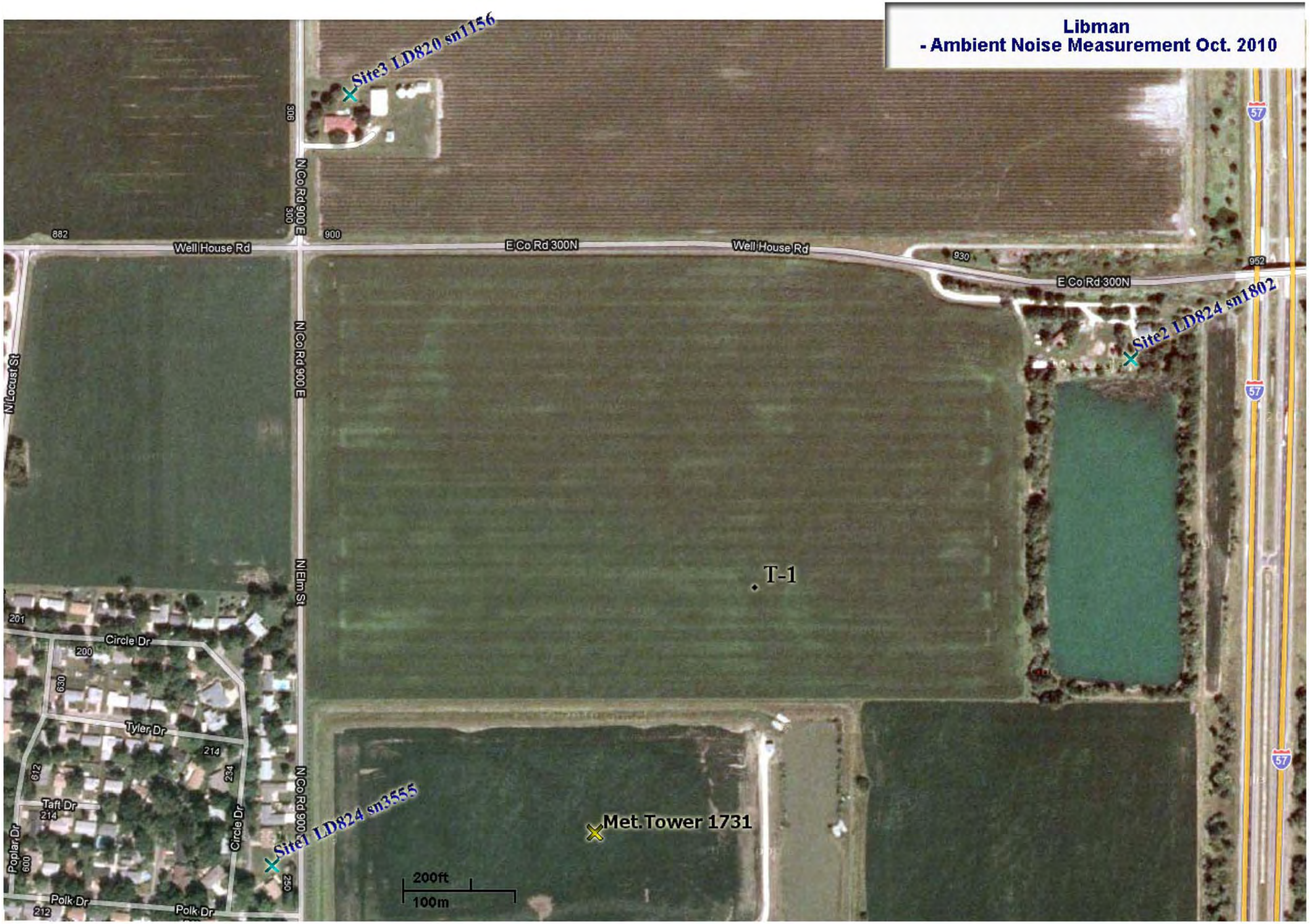
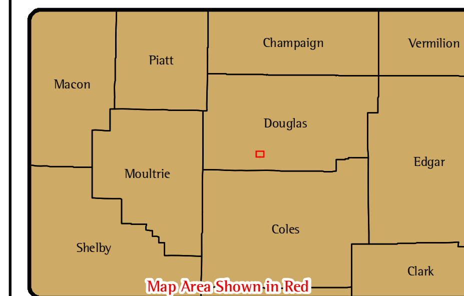


Figure 12.

Libman Wind Energy Project Ambient Noise Monitoring Locations



Location

Section 3, T41N, R8E
Douglas County, Illinois

0 250 500 Feet

Project Information

Project Number : 010-0129-01
Modified November 01, 2010

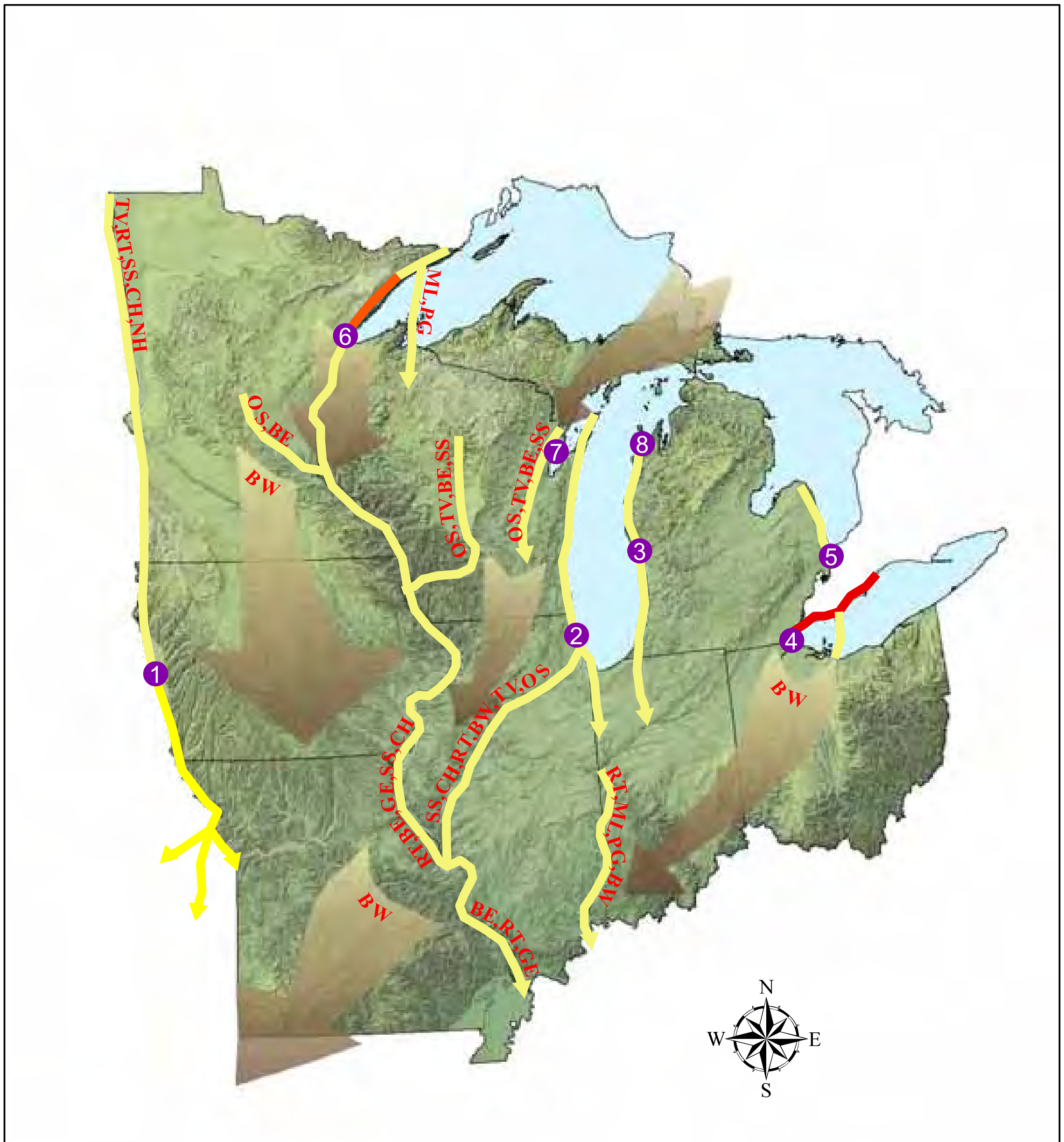
Data Sources include Wes Engineering, ESRI

NRC Natural Resources Consulting, Inc. now Stantec

209 Commerce Parkway
P.O. Box 128
Cottage Grove, WI 53527-0128
phone: 608-839-1998
fax: 608-839-1995
www.stantec.com

Libman Figure 12.mxd Map Created by A. Selk

Figure 13



FALL RAPTOR MIGRATION ROUTES

SYMBOL	COMMON NAME
AK	American Kestrel
BE	Bald Eagle
BO	Boreal Owl
BW	Broadwing
CH	Cooper's Hawk
GE	Golden Eagle
LEO	Long-eared Owl
ML	Merlin
NG	Northern Goshawk
NH	Northern Harrier
NSWO	Northern Saw-whet Owl
OS	Osprey
PG	Pregrine Falcon
RL	Rough-legged Hawk
RS	Red-shouldered Hawk
RT	Red-tailed Hawk
SEO	Short-eared Owl
SS	Sharp-shinned Hawk
TV	Turkey Vulture

Major Raptor Migration Observation Sites

1. Hitchcock Nature Area (CH,RT,SS,TV,SW,NH)
2. Illinois Dunes State Park (ML,NH,PG,SEO)
3. Muskegon State Park (SS,RL,RT)
4. Lake Erie Metropark (TV,OS,BE,NH,SS,CH,RT, RL,GE,AK,ME,PG)
5. Port Huron (PG,ML)
6. Hawk Ridge, Duluth (TV,OS,BE,NH,SS,BW,NG, RT,RL,AK,ML,PG,BO,NSWO,LEO)
7. Little Suemico (SS,BW,NSWO)
8. Sleeping Bear Dunes NL (RL,RT,SS)

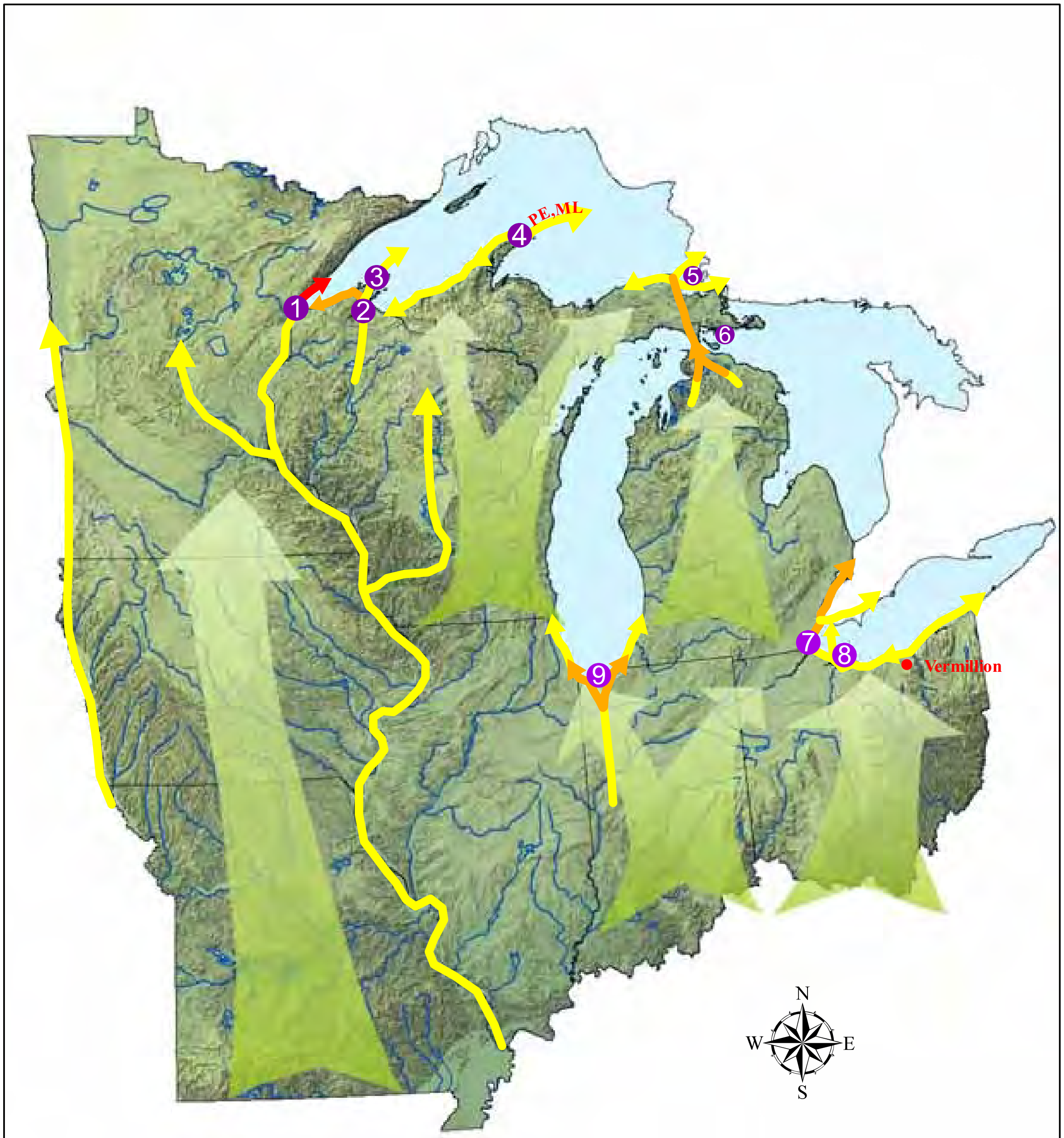
Legend
Number of Birds

- 2,500 - 25,000
- 25,000 - 50,000
- 50,000 - 100,000
- >100,000

Map Created for: Division of Migratory Birds
October, 2006
Fall Migratory Bird Information provided by
USFWS Migratory Bird Biologist Bob Russell

U.S. Fish & Wildlife Service
Region 3 NWRS
Division of Conservation Planning
Twin Cities, Minnesota 55111

Figure 14



SPRING RAPTOR MIGRATION ROUTES

SYMBOL	COMMON NAME
AK	American Kestrel
BE	Bald Eagle
BO	Boreal Owl
BW	Broadwing
CH	Cooper's Hawk
GE	Golden Eagle
LEO	Long-eared Owl
ML	Merlin
NG	Northern Goshawk
NH	Northern Harrier
NSWO	Northern Saw-whet Owl
OS	Osprey
PG	Pregrine Falcon
RL	Rough-legged Hawk
RS	Red-shouldered Hawk
RT	Red-tailed Hawk
SEO	Short-eared Owl
SS	Sharp-shinned Hawk
TV	Turkey Vulture

Major Raptor Migration Observation Sites

1. West Skyline Observatory, Duluth (TV,OS,BE,SS, BW,RT,RL,GE)
2. Chequemegon Bay, Ashland (TV,SS,BW,RT,GE,BE)
3. Apostle Islands (AK,ML,PG)
4. Manitou Island/Keewenaw Peninsula (OS,SS,RL, NH,BE,PE,ML)
5. Whitefish Point (TV,BE,NH,SS,RS,BW,RT,RL,GE, AK,ML,PG,NSWO,BO,LEO)
6. Straits of Mackinac (TV,BE,SS,CH,RS, RT,RL,BW,GE)
7. Port Huron (TV,SS,RS,RT,BW)
8. Lake Erie Islands (TV,SS,BE,NH,OS,ML,PG)
9. Indiana Dunes NL (OS,NH,SS,RS,BW,RT,AK)

Legend
Number of Birds

- 2,500 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- >20,000

Map Created for: Division of Migratory Birds
October, 2006
Fall Migratory Bird Information provided by
USFWS Migratory Bird Biologist Bob Russell

U.S. Fish & Wildlife Service
Region 3 NWRS
Division of Conservation Planning
Twin Cities, Minnesota 55111

LIBMAN WIND ENERGY PROJECT – ARCOLA, DOUGLAS COUNTY, ILLINOIS
VISUAL RESOURCE PHOTOSIMULATIONS

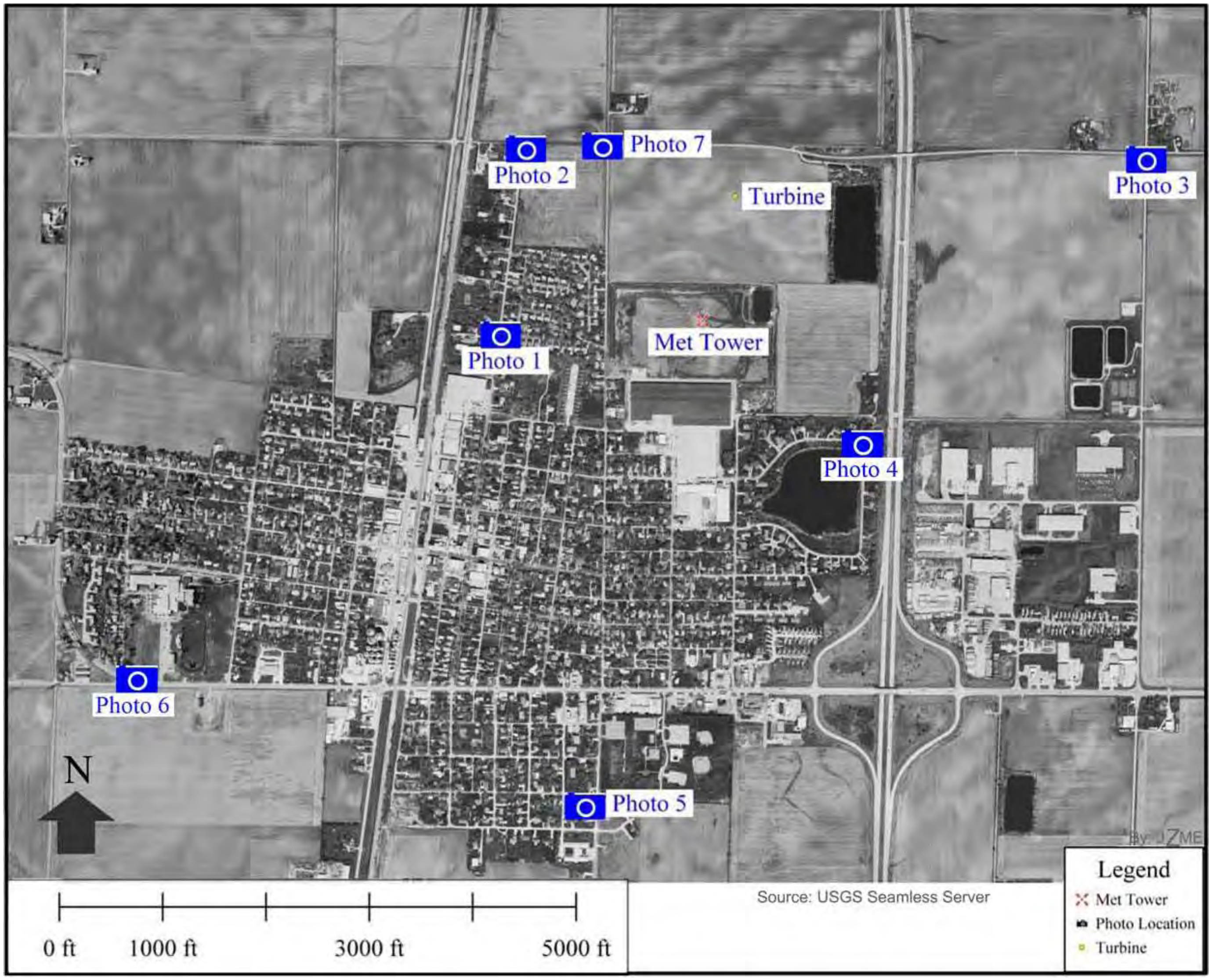


Photo 1: Looking east from Locust Street and Polk Drive (Approximately 2,670 feet from the proposed turbine)

Photo 2: Looking southeast from N. Locust Street and Well House Road (Approximately 2,064 feet from the proposed turbine)

Photo 3: Looking southwest from Egyptian Trail and Well House Road (Approximately 3,997 feet) from the proposed turbine)

Photo 4: Looking northwest from East Madison Street and Dagwood Drive (Approximately 2,680 feet from the proposed turbine)

Photo 5: Looking southeast from South Elm Street and Fishel Street (Approximately 1.2 miles from the proposed turbine)

Photo 6: Looking northeast from Diamond Street and West Springfield Road (Approximately 1.4 miles from the proposed turbine)

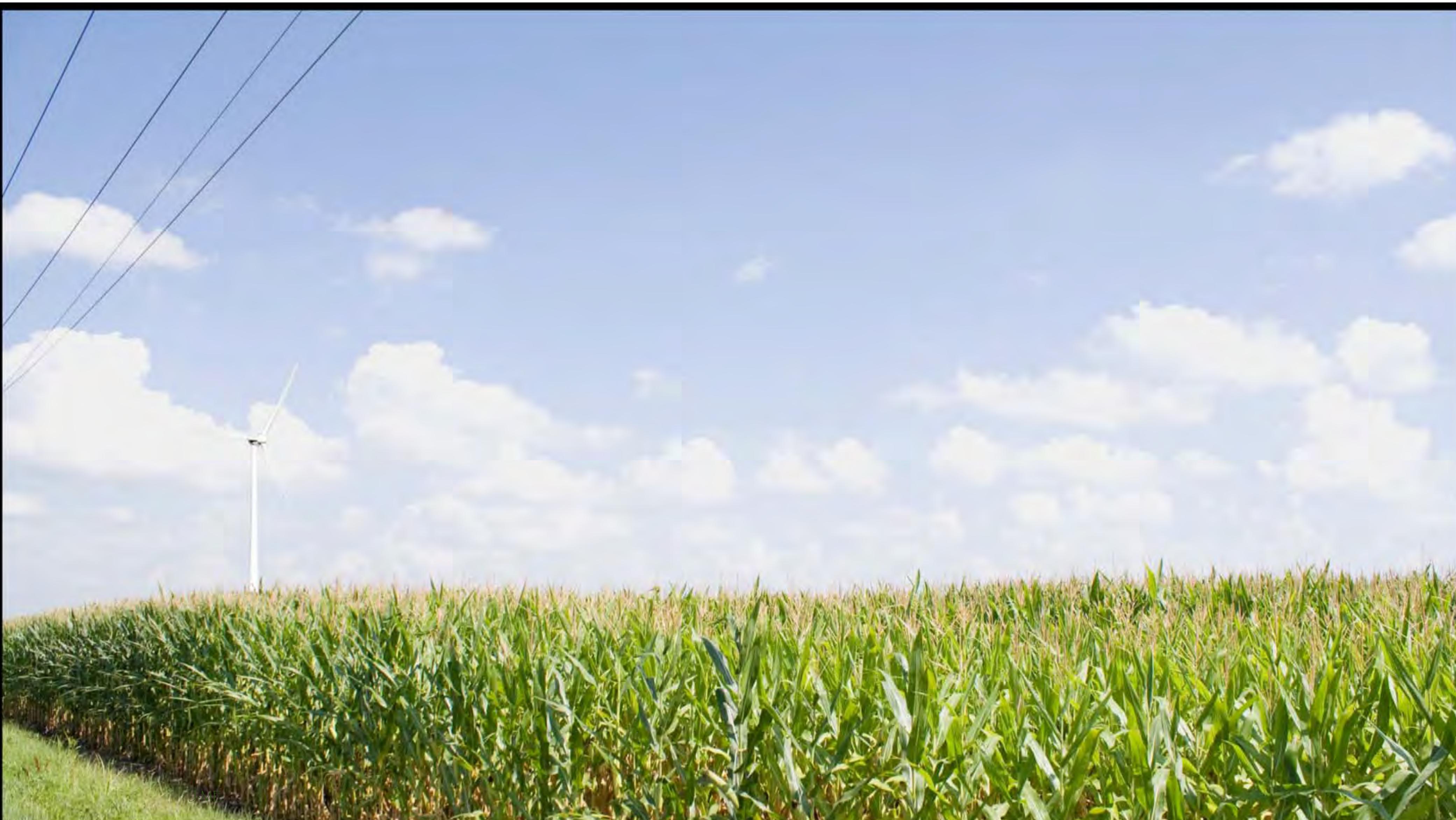
Photo 7: Looking southeast from North Elm Street and Well House Road (Approximately 1,249 feet from the proposed turbine)

Note: Photo simulations and distances from turbine are based on the initial proposed turbine location, mapped above. Final proposed location is approximately 500 feet south of the location referenced above.

Location 1:
N. Locust St. & Polk Dr.
Looking Northeast

Libman Company Wind Turbine
Photo-simulation with turbine
July 2010

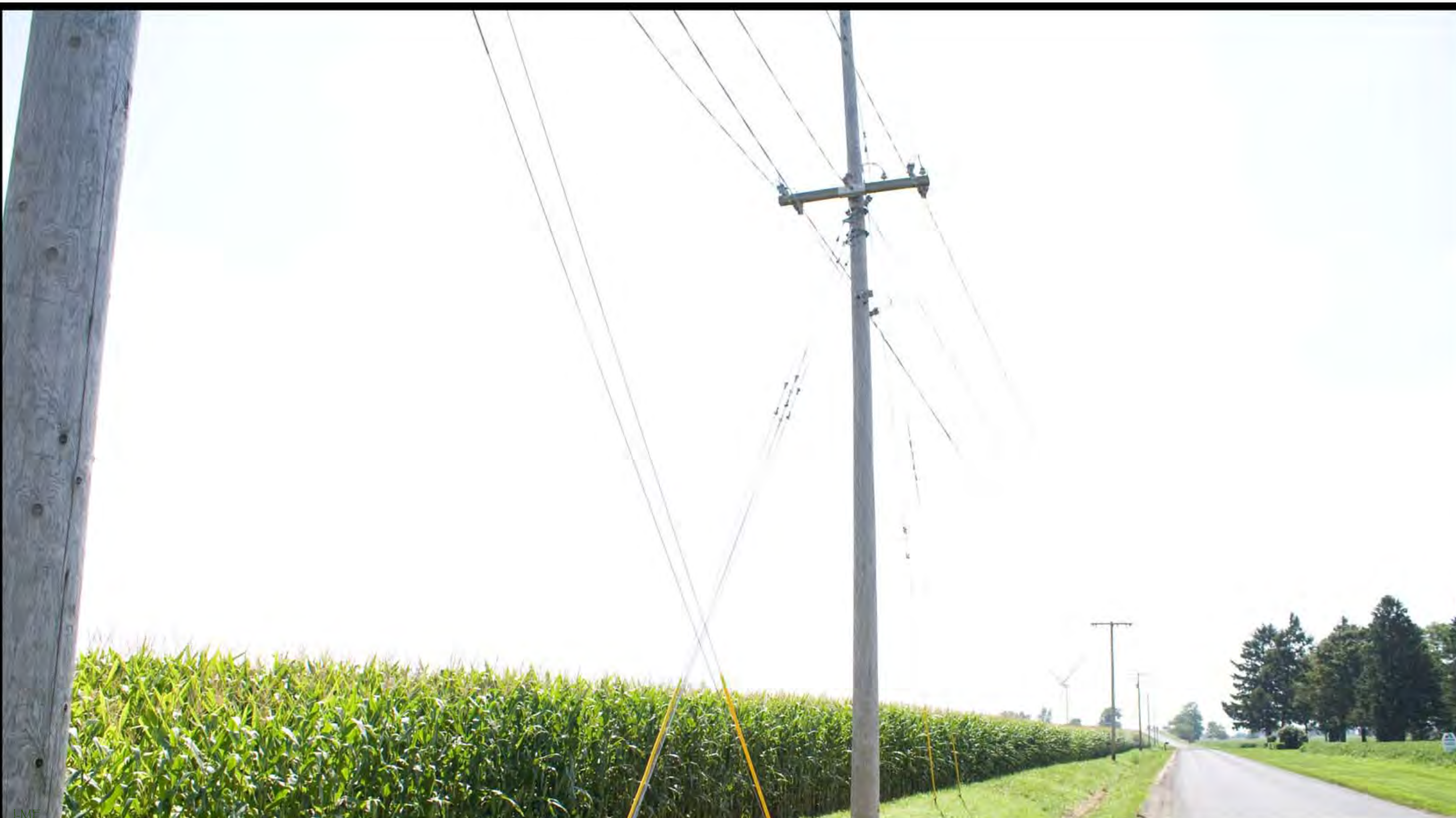
WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715



Location 2:
N. Locust St. & Wellhouse Rd.
Looking Southeast

Libman Company Wind Turbine
Photo-simulation with turbine
July 2010

WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715



Location 3:
Egyption Tr. & Wellhouse Rd.
Looking Southwest

Libman Company Wind Turbine
Photo-simulation with turbine
July 2010

WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715

Location 4:
E. Madison St. & Dagwood Dr.
Looking Northwest

Libman Company Wind Turbine
Photo-simulation with turbine
July 2010

WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715

Location 5:
S. Elm St. & Fishel St.
Looking North

Libman Company Wind Turbine
Photo-simulation with turbine
July 2010

WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715

Location 6:
S.Diamond St. & W. Springfield
Looking Northeast

Libman Company Wind Turbine
Photo-sim. (Turbine Not Visible)
July 2010

WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715

Location 7:
N. Elm St. & Wellhouse Rd.
Looking Southeast

Libman Company Wind Turbine
Photo-simulation with turbine
July 2010

WES Engineering, Inc.
706 S. Orchard St.
Madison, WI 53715

APPENDIX C: AGENCY COORDINATION

Attachment C-1
Illinois Department of Natural Resources

July 18, 2010

Illinois DNR
Keith Shank
One Natural Resource Way
Springfield, IL 62702-1271

RE: Libman Wind Project, Arcola, IL

Dear Mr. Shank:

I am writing to request an additional review of the proposed Libman wind turbine project in Douglas County, IL as the turbine location has moved 1000 feet North. The Libman Wind Project is a 1.5MW wind project consisting of one large wind turbine installed on property owned by Libman corporation on the North edge of Arcola. I am acting on behalf of the Libman project to prepare the maps and turbine information and assist with your review.

Libman proposes to install a single large turbine 415' tall. The electricity would be carried underground on the property and connect to the existing transformer and switchgear supplying the Libman plant with electricity. The site is a mixture of agricultural and industrial use. I look forward to your review and response.

Please advise if there are any known state threatened or endangered species in this area. Attached are maps and photos for your review.

Sincerely,

Wes Slaymaker, P.E.
President
wes@WESengineering.com
WES Engineering Inc
706 S. Orchard St
Madison, WI 53715
608-259-9304

Figure 1- Libman turbine location and 1000' radius buffer (green circle)

Photo 1- Libman Facility and proposed turbine location to the North.

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: Libman Company ARRA Comm REP
Project Number(s): 1005988 [0715257]
County: Douglas

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.

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 #:*	1005988
Contact:	Alyson Grady	Date:	02/08/2010
Address:	620 East Adams Springfield, IL 62701		

Project: Libman Company ARRA Comm REP
Address: 220 N Sheldon Street, Arcola

Description: The project will construct a 100m tower, 2.5 MW wind turbine on a 40 acre plot of land bordering the Libman Company's factory in Arcola to provide a renewable energy source for the factory.

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. **Therefore, consultation under part 1075 is terminated.**

Wetland Review (Part 1090)
The National Wetlands Inventory does not show wetlands within 250 feet of the project location. **Therefore, the wetland review under Part 1090 is terminated.**

This review 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, Natural Areas, or wetlands 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. Termination does not imply IDNR's authorization or endorsement.

Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: Douglas
Township, Range, Section:
14N, 8E, 3

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.

Attachment C-2
Illinois Historic Preservation Agency

May 5, 2010

Anne E. Haaker
Deputy State Historic Preservation Officer
Preservation Services Division
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

RE: Libman Wind Project, Arcola, IL

Dear Ms. Haaker:

I am writing to request a review of the proposed Libman wind turbine project in Douglas County, IL. The Libman Wind Project is a 2MW wind project consisting of one large wind turbine installed on property owned by Libman corporation on the North edge of Arcola. I am acting on behalf of the Libman project to prepare the maps and turbine information and assist with your review.

Libman proposes to install a single large turbine that could be as tall as 492', likely it will be shorter. The electricity would be carried underground on the property and connect to the existing transformer and switchgear supplying the Libman plant with electricity. The site is a mixture of agricultural and industrial use. I look forward to your review and response.

Please advise if there are any known state historical structures that would be affected (viewshed) or any known artifacts on the property where the proposed turbine would be constructed. Attached are maps and photos for your review.

Sincerely,

Wes Slaymaker, P.E.
Project Engineer
wes@WESengineering.com
WES Engineering LLC
706 S. Orchard St
Madison, WI 53715
608-259-9304

turbine GPS coords

39 deg 41’ 30.2”
88 deg 17’ 46.1”

Photo 1- Libman building in the foreground, looking North

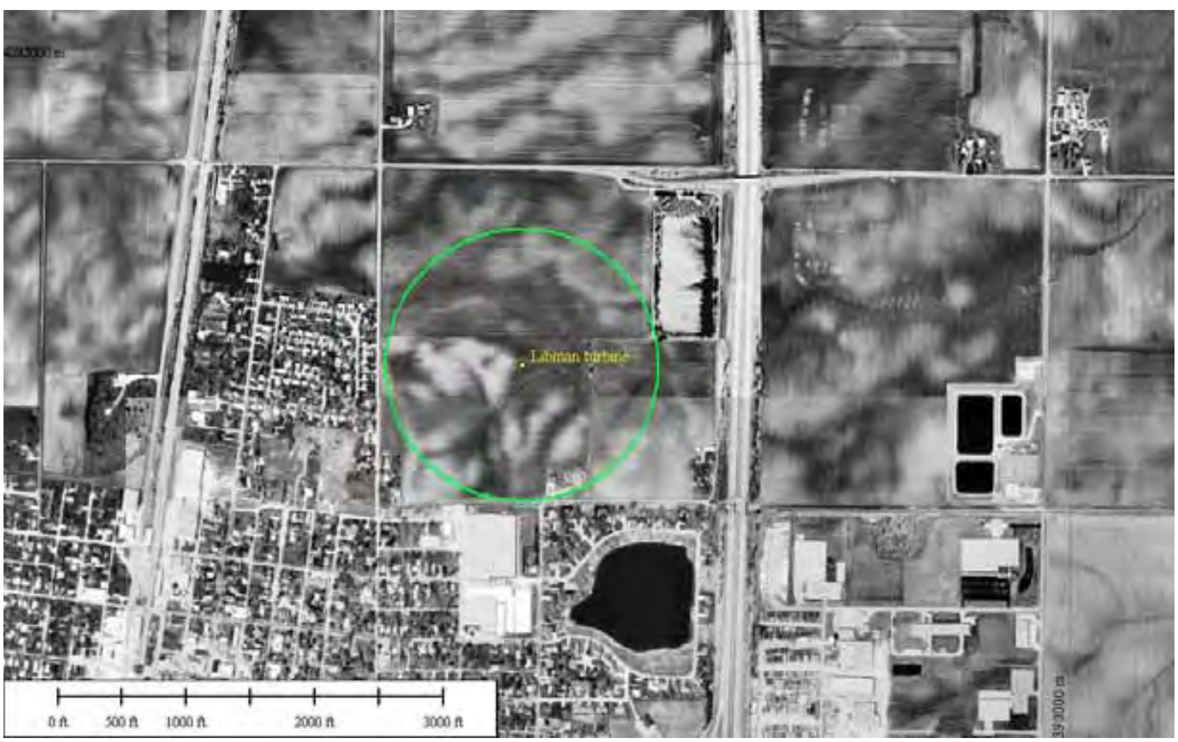


Figure 1- Libman approx. turbine location and 1000’ radius buffer (green circle)

Illinois Historic
Preservation Agency

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

Douglas County PLEASE REFER TO: IHPA LOG #001050610
Arcola
North edge of Arcola; South of E 300 North Road, West side of I-57
Libman Wind Turbine

May 6, 2010

Wes Slaymaker
W.E.S. Engineering Inc.
706 S. Orchard St.
Madison, WI 53715

Dear Mr. Slaymaker:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

AEH

July 18, 2010

Anne E. Haaker
Deputy State Historic Preservation Officer
Preservation Services Division
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

RE: Libman Wind Project, Arcola, IL

Dear Ms. Haaker:

I am writing to request an additional review of the proposed Libman wind turbine project in Douglas County, IL as the turbine location has moved 1000 feet North. The Libman Wind Project is a 1.5MW wind project consisting of one large wind turbine installed on property owned by Libman corporation on the North edge of Arcola. I am acting on behalf of the Libman project to prepare the maps and turbine information and assist with your review.

Libman proposes to install a single large turbine 415' tall. The electricity would be carried underground on the property and connect to the existing transformer and switchgear supplying the Libman plant with electricity. The site is a mixture of agricultural and industrial use. I look forward to your review and response.

Please advise if there are any known state historical structures that would be affected (viewshed) or any known artifacts on the property where the proposed turbine would be constructed. Attached are maps and photos for your review.

Sincerely,

Wes Slaymaker, P.E.
President
wes@WESengineering.com
WES Engineering Inc.
706 S. Orchard St
Madison, WI 53715
608-259-9304

Figure 1- Libman turbine location and 1000' radius buffer (green circle)

Photo 1- Libman Facility and proposed turbine location to the North.

Illinois Historic
Preservation Agency

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

Douglas County PLEASE REFER TO: IHPA LOG #004072110
Arcola
South of E 300 North and west of I-57
Libman Wind Turbine Project

July 22, 2010

Mr. Wes Slaymaker, P.E.
WES Engineering Inc.
President
706 South Orchard Street
Madison, Wisconsin 53715

Dear Sir:

Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966 (16 USC 470), as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

The project area has not been surveyed and may contain prehistoric/historic archaeological resources. Accordingly, a Phase I archaeological reconnaissance survey to locate, identify, and record all archaeological resources within the project area will be required. This decision is based upon our understanding that there has not been any large scale disturbance of the ground surface (excluding agricultural activities) such as major construction activity within the project area which would have destroyed existing cultural resources prior to your project. If the area has been heavily disturbed prior to your project, please contact our office with the appropriate written and/or photographic evidence.

The area(s) that need(s) to be surveyed include(s) all area(s) that will be developed as a result of the issuance of the federal agency permit(s) or the granting of the federal grants, funds, or loan guarantees that have prompted this review.

Enclosed you will find an attachment briefly describing Phase I surveys and a list of archaeological contracting services. THE IHPA LOG NUMBER OR A COPY OF THIS LETTER SHOULD BE PROVIDED TO THE SELECTED PROFESSIONAL ARCHAEOLOGICAL CONTRACTOR TO ENSURE THAT THE SURVEY RESULTS ARE CONNECTED TO YOUR PROJECT PAPERWORK.

If you have further questions, please contact Joseph S. Phillippe, Chief Archaeologist at 217/785-1279.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
 Preservation Officer

AEH

Enclosure

LEGEND

SOURCE OF BASE MAP

CONSTRUCTION COORDINATES

CONSTRUCTION NOTES & SPECIFICATIONS

*** DRAFT IN PROGRESS ***
7.2.10

LIBMAN

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

SITE PLAN

SHEET 1

REVISION 0

PROPOSAL FOR AN ARCHAEOLOGICAL RECONNAISSANCE OF A PROPOSED WIND TURBINE SITE IN DOUGLAS COUNTY, ILLINOIS

For Submission To:

Mr. Wes Slaymaker, P.E.
WES Engineering, Inc.
706 South Orchard Street
Madison, Wisconsin 53715

By:

Dr. Brian Adams
Department of Anthropology
Public Service Archaeology & Architecture Program
1707 South Orchard Street
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801

Project Period: 07/28/2010 - 08/18/2010
Amount Requested: $ 981.00
Project Number 010-311

Accepted by:____

PROPOSAL FOR AN ARCHAEOLOGICAL RECONNAISSANCE OF A PROPOSED WIND TURBINE SITE IN DOUGLAS COUNTY, ILLINOIS

INTRODUCTION

This is a proposal and cost estimate for a Phase I archaeological reconnaissance of a proposed wind turbine site near Arcola in Douglas County, Illinois. The archaeological survey proposed herein is in accordance with guidelines established by the Illinois Historic Preservation Agency (IHPA) regarding Phase I archaeological surveys. This particular project will be carried out using personnel from the Department of Anthropology, University of Illinois at Urbana-Champaign with Dr. Brian Adams serving as Project Director.

RESEARCH METHODOLOGY

The archaeological reconnaissance of the proposed project area will be carried out in three phases:

1. A literature and records search for geologic conditions, historic and prehistoric sites will be conducted at the University of Illinois and the Illinois Historical Survey in Urbana, Illinois.

2. A surface reconnaissance of the proposed project area will be conducted to identify archaeological sites located within the boundaries of the proposed project area. The exact nature of the survey will depend on current ground surface visibility conditions within the project area. In accordance with IHPA Guidelines: for recently plowed locations with greater than 25 percent surface visibility, a pedestrian reconnaissance in five meter intervals will be conducted; for plowed locations with less than 25 percent visibility, a screened posthole test survey set up in a fifteen meter grid will be employed. (Grid spacing will be reduced to five meters if materials are encountered); for previously unplowed locations a screened posthole test survey, or screened power auger survey, in either a 15 or 5 meter grid, depending on findings, will be employed. All existing structures in the project area will be photographically documented.

3. An Archaeological Survey Short Report (ASSR) will be prepared outlining the findings of both the records and field research. This report will provide project and site specific recommendations.

Any archaeological sites discovered will be recorded with the Illinois State Museum. All materials collected and records made for this project will be temporarily curated by the Department of Anthropology, University of Illinois at Urbana-Champaign. Final curation will be with the Illinois State Museum in Springfield, Illinois. Site locations reported by this project are to be kept confidential.

PERSONNEL AND SCHEDULING

The Phase I survey of the proposed Douglas County wind turbine site will be conducted by a Project Archaeologist, one Project Specialist, and two Project Facilitators. The historic records documentation portion of the project will begin immediately following the acceptance of this proposal.

One day will be spent researching the records at the Illinois Historical Survey and the University of Illinois to determine any known cultural resources. Efforts will also be directed to evaluate soil deposition characteristics to determine locations where deep soil tests are appropriate or where past disturbance may have occurred. This portion of the project will be done by a single project facilitator.

Field research will be conducted within a week after the records search, weather and ground conditions permitting. Please be aware that the guidelines do not allow work in the snow or with frozen soils. It is anticipated that a field crew of three should complete all field work in one-half day.

Following the fieldwork all materials will be processed and site numbers will be requested from the Illinois State Museum Society. The laboratory portion of the project should be completed in one day. This will be followed by the preparation of the ASSR for submission to Mr. Wes Slaymaker, or his designated agent. The report should be available within two weeks after the completion of the field investigations.

BUDGET PROPOSAL

DIRECT COSTS		
Personnel		
Project Archaeologists (12 hours @ $ 35.00)	$	420
Project Specialists (8 hours @ $ 23.00)	$	184
Project Facilitator (8 hours @ $ 18.00)	$	144
Total Salaries	$	748
Other Direct Costs		
Transportation	$	35
TOTAL DIRECT COSTS	$	783
INDIRECT COSTS		
Private Activities Rate ($783 @ 25.3 %)	$	198
TOTAL COSTS	**$**	**981**

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Public Service Archaeology
& Architecture Program
Department of Anthropology
1707 South Orchard Street
Urbana, Illinois 61801

phone (217) 333-1636
fax (217) 244-1911

28 July 2010

Mr. Wes Slaymaker, P.E.
WES Engineering, Inc.
706 South Orchard Street
Madison, Wisconsin 53715

Dear Mr. Slaymaker:

Thank you for your interest in a proposal from the Public Service Archaeology & Architecture Program for a Phase I archaeological reconnaissance for proposed wind turbine site near Arcola in Dougls County. I anticipate the area will require a pedestrian reconnaissance to achieve the guidelines established by the Illinois Historic Preservation Agency. I also anticipate the field investigation can be completed in one-half day. We should be able to begin the background investigations immediately upon award notification.

Should you elect to have the University of Illinois conduct the project, I will serve as the Project Director and staffing will come from our Urbana office. To establish a contract I will need a letter from you stating your acceptance of the proposal and budget and permission to be on the project property or simply sign and return our cover page. We will also need copies of any correspondence that may exist with the Illinois Historic Preservation Agency or the U.S. Army Corps of Engineers regarding cultural resources. Given the small size of this project, I will not formally process this through the University's Grants and Contracts office. Instead, I will provide an invoice to you when I submit the completed report.

Once again, thank you for considering our services and feel free to call me with questions at (217) 333-1636.

Sincerely,

Brian Adams

Brian Adams

e: Proposal & Budget

ARCHAEOLOGICAL RECONNAISSANCE OF A PROPOSED LIBMAN WIND TURBINE DEVELOPMENT IN DOUGLAS COUNTY, ILLINOIS

Project No. 10-311

for submission to & funded by:

Mr. Wes Slaymaker, P.E.
WES Engineering Inc.
706 South Orchard Street
Madison, Wisconsin 53715

by:

Dr. Brian Adams
Assistant Director

18 August 2010

PUBLIC SERVICE ARCHAEOLOGY & ARCHITECTURE PROGRAM

Department of Anthropology
1707 South Orchard Street
University of Illinois
at Urbana-Champaign.
Urbana, Illinois 61801

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

REVIEWER ____________________
Date: ____________________
_____Accepted _______Rejected
IHPA USE ONLY (Form ASSR0886)

IHPA Log # 004072110

Locational Information and Survey Conditions

County: Douglas

Quadrangle: Arcola 7.5'

Project Type/Title: Wind Energy Development/ Libman Wind Energy

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

Sec: 3 **T.:** 14N **R.:** 8E **Natural Division (No.):** 4a

U.T.M.: E. 388740 to E. 388900 and N. 4394120 to N. 4394520

Project Description: The project is to construct proposed wind energy collection turbine and associated facilities in a rural area immediately northeast of the City of Arcola.

Topography: The project area is located in the glacially formed uplands west of the Embarras River and east of the Kaskaskia River.

Soils: Flanagan silt loam, 0 to 2 percent slopes and Drummer-Milford silty clay loams, 0 to 2 percent slopes (National Resources Conservation Services 2010).

Drainage: Scattering Fork of the Embarras River.

Land Use/Ground Cover (Include % Visibility): The project area is an agricultural field that was planted with soybeans and corn with 25 percent surface visibility.

Survey Limitations: None

Archaeological and Historical Information

Historic Plats/Atlases/Sources: See Selected Sources.

Previously Reported Sites: There are no previously reported sites within the project area.

Previous Surveys: The south edge of the proposed project area was previously surveyed (IHPA Document Number 17951) in 2009 (Adams 2009).

Regional Archaeologists Contacted: None.

Investigation Techniques: The project area was investigated by pedestrian reconnaissance at 5-meter intervals.

Time Expended: 10.0 field hours

Sites/Find Spots Located: None

Cultural Material: N/A

(Curated at) N/A

Collection Techniques: N/A

Areas Surveyed (Acres & Square Meters): 17.2 Acres (69,600 Square Meters)

(OVER)

Results of Investigation and Recommendations: *(Check One)*

X 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: See Continuation Section.

Archaeological Contractor Information:

Archaeological Contractor: Public Service Archaeology & Architecture Program

Address/Phone: Department of Anthropology
1707 South Orchard Street
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801
(217) 333-1636

Surveyor(s): A. Berkson, M. Smith

Survey Date(s): 8/10 & 17/2010

Report Completed By: Brian Adams

Date: August 18, 2010

Submitted By (Signature and Title): Brian Adams **Assistant Director**

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

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

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

___ 3) Site Form(s): One Copy of Each Form;

xxx 4) All Relevant Project Correspondence;

xxx 5) Additional Information Sheets As Necessary.

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

WES Engineering, Inc.
706 South Orchard Street
Madison, Wisconsin 53715

Contact Person: Mr. Wes Slaymaker

Phone Number: (608) 259-9304

Reviewers Comments:

CONTINUATION SECTION

Comments:

The Public Service Archaeology & Architecture Program of the University of Illinois at Urbana-Champaign was contracted by Mr. Wes Slaymaker of WES Engineering, Inc. to conduct a Phase I archaeological reconnaissance survey of a 6.96 hectares (17.2 acre) of a proposed wind turbine project near the City of Arcola (Figure 1). The project area consists of the proposed wind turbine site along with access and utility easements. The project investigations included standard background research, a field study, laboratory analyses, and the preparation of this report.

A review of the electronic site files maintained by the Illinois State Museum indicates that a small east to west extending corridor of the project area was previously surveyed (IHPA Document Number 17951) in 2009 (Adams 2009). There are no previously recorded sites located within the survey tract. An examination of the historical documents on the Illinois Public Domain Land Tract Sales database indicates that the project area crosses tracts originally purchased by John C. Dodge on 05 August 1852. The 1834 United States General Land Office (USGLO) survey plat (Figure 2) indicates that the project area was covered by prairie vegetation with no structures or improvements (USGLO 1834). Historic nineteenth and twentieth century maps (Figures 2 and 3) do not depict any structures in the project area (George A. Ogle and Company 1893, 1914; W.R. Brink and Company 1875; United States Geological Survey 1935). The historic records suggest that the project area has been used primarily for rural pursuits since Euro-American settlement of the area.

Field investigation of the project area was undertaken on August 10 and 17, 2010. The survey area is located immediately northeast of the City of Arcola and roughly 300 meters west of the intersection of Well House Road with U.S. Interstate Highway 57. It is bordered to the north by Well House Road, to the south by a commercial facility, and to the east and west by agricultural fields (Figure 4). The project area consisted of agricultural fields planted with soybeans and corn and small grass covered ditches and field roads with an average surface visibility of 25 percent. The project area was investigated by pedestrian reconnaissance at 5-meter intervals. No standing structures were found within the project area. Field investigation found no artifacts or other evidence for archaeological sites in the project area.

The Public Service Archaeology & Architecture Program examined a 6.96 hectares (17.2 acre) tract for a proposed wind turbine project northeast of Arcola in August 2010. The investigations found no archaeological sites or structures in the project area. Based on the findings of *No Historic Properties*, the project area is recommended for cultural resource clearance.

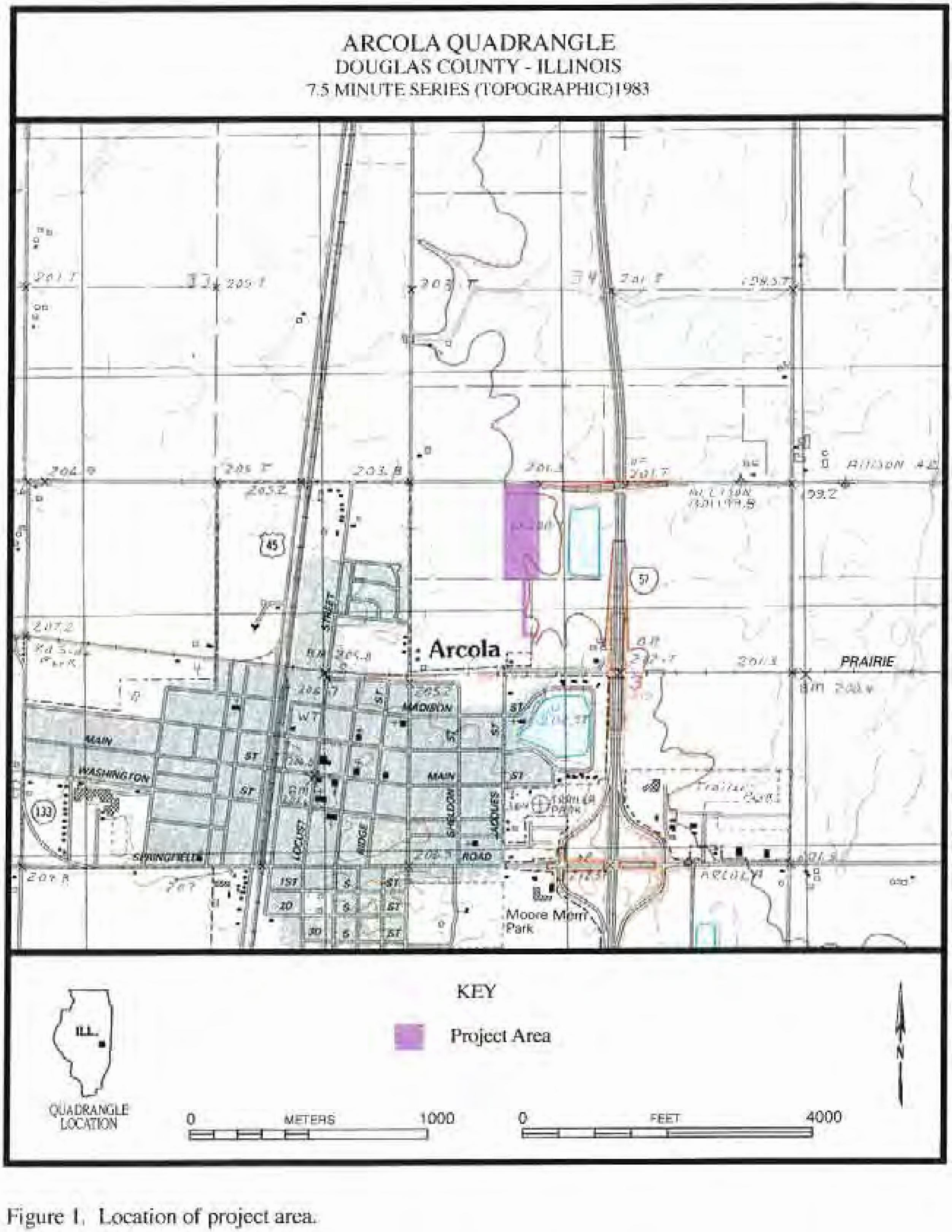


Figure 1. Location of project area.

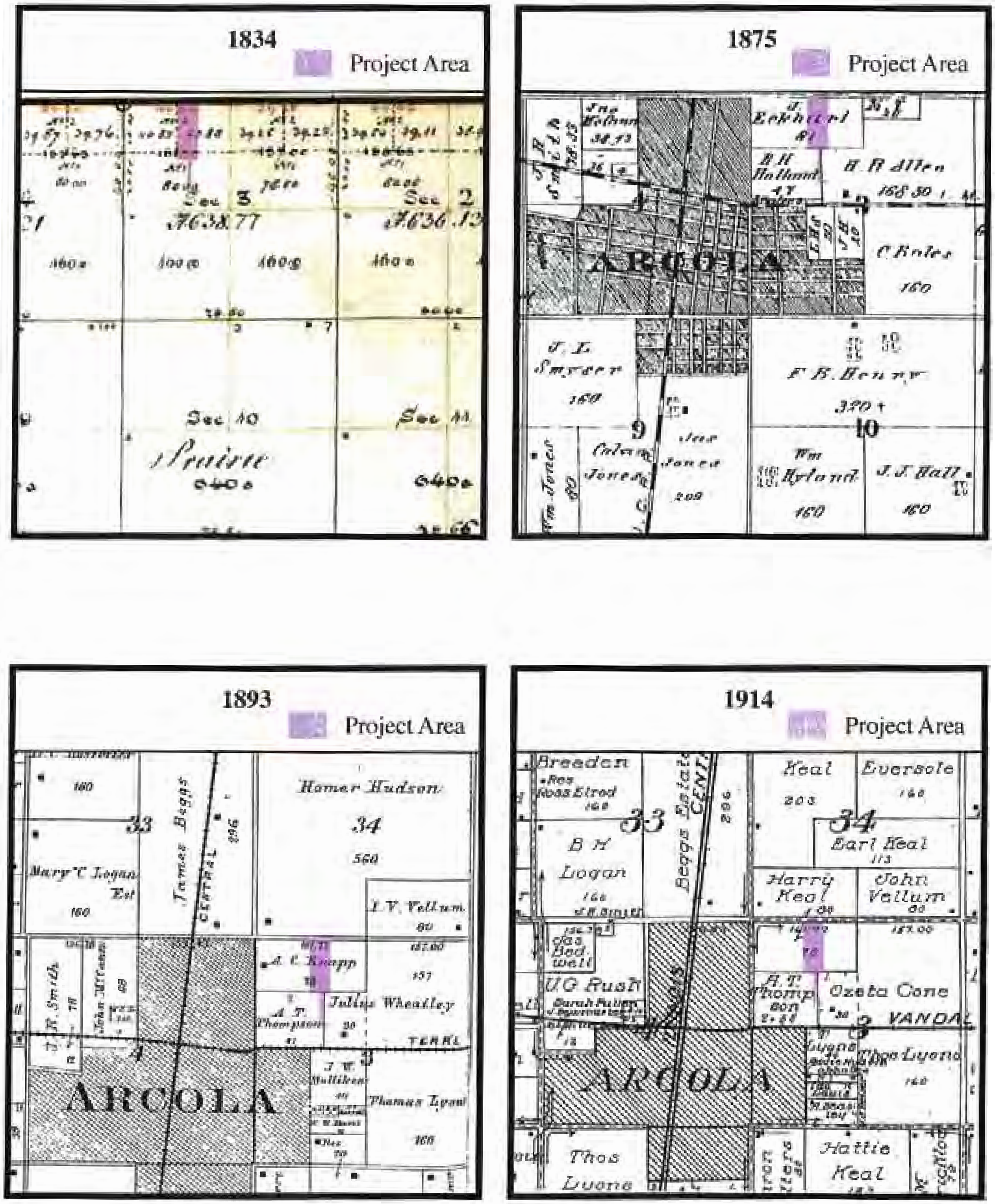


Figure 2. Portions of the 1834 United States General Land Office survey plat and 1875, 1893, and 1914 maps of Douglas County, Illinois.

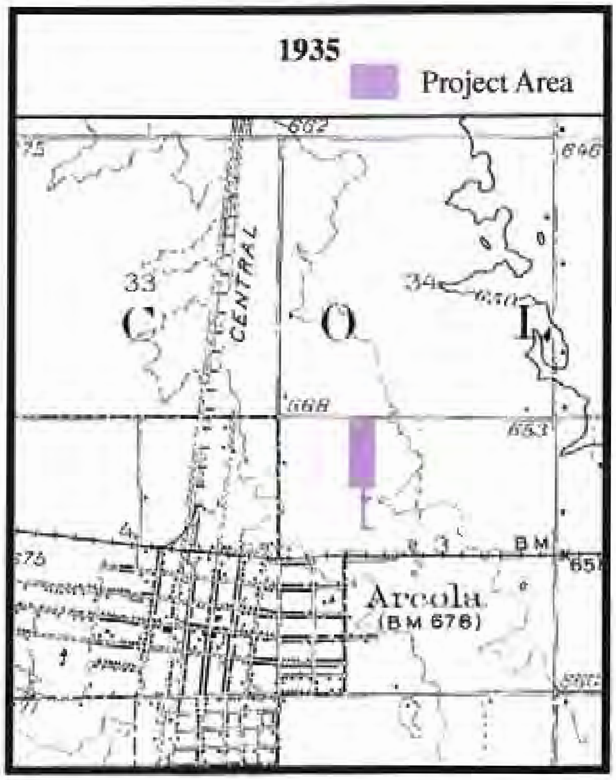


Figure 3. Portions of the 1935 Arcola 15' quadrangle.

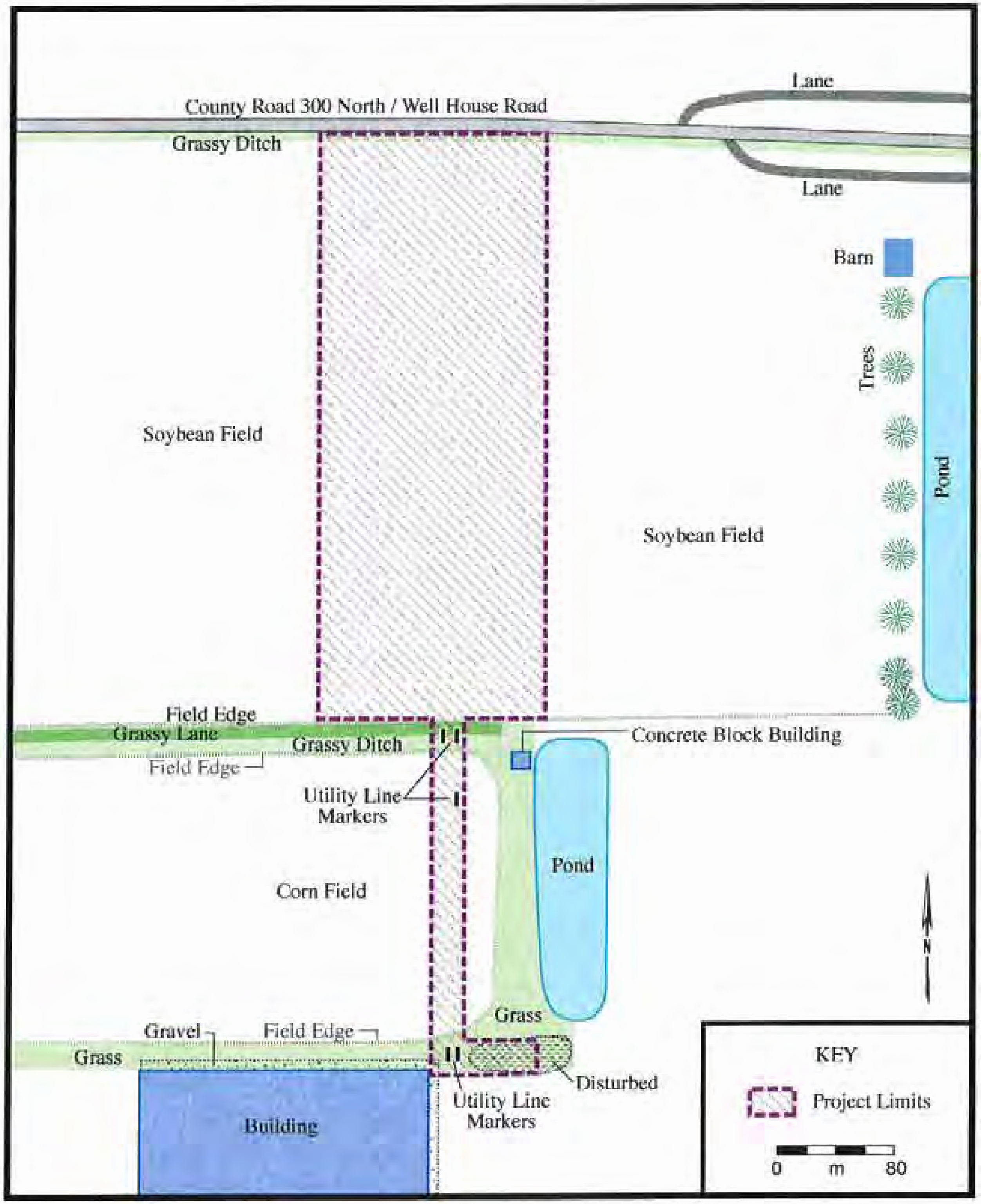


Figure 4. Sketch map of project area.

SELECTED SOURCES

Adams, Brian

2007a *Archaeological Reconnaissance of the Emerald Renewable Energy Tuscola Site in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 12 January 2007.

2007b *Archaeological Reconnaissance of the Proposed Tuscola Business Centre in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 6 July 2007.

2007c *Phase I Archaeological Reconnaissance of the Proposed Water Main Extensions in Coles and Douglas Counties, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 9 July 2007.

2009 *Archaeological Reconnaissance of a Proposed Arcola Water Main Project in Douglas County, Illinois.* Public Service Archaeology & Architecture Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, 19 May 2009.

F. A. Battey and Company

1884 *County of Douglas, Illinois.* F. A. Battey and Company, Chicago.

George A. Ogle and Company

1893 *Plat Book of Douglas County, Illinois.* George A. Ogle and Company, Chicago.

1914 *Standard Atlas of Douglas County, Illinois.* George A. Ogle and Company, Chicago.

Illinois Historic Architectural and Archaeology Resources Geographic Information System

Illinois Historical Survey, Urbana

Illinois State Museum, Statewide Archaeological Database, Springfield.

Kreisa, Paul P.

1996a *Archaeological Reconnaissance of 20.9 Acres for a Water Well and Transmission Main in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 28 February 1996.

1996b *Archaeological Reconnaissance of 7 Acres for the Tuscola Wastewater Treatment Facility in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 28 June 1996.

1998 *Archaeological Reconnaissance of 9.3 Acres for the Proposed Villa Grove Wastewater Treatment Plant Improvements and Excess Flow System in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 6 February 1998.

2003a *Archaeological Reconnaissance for the Proposed Villa Grove Industrial Park in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 26 March 2003.

2003b *Archaeological Reconnaissance for the Proposed Camargo to Villa Grove Water Main in Douglas County, Illinois.* Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 31 July 2003.

Lowry, Francis A.
1943 Prehistoric Indian Mounds of Central Illinois. *Transactions of the Illinois State Academy of Science* 36:361-364.

McDowell, Jacqueline M.
2000 *Archaeological Reconnaissance for the City of Villa Grove Park Acquisition in Douglas County, Illinois*. Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 30 November 2000.

Munsell Publishing Company
1910 *Illinois Historical and Douglas County Biographical*. Munsell Publishing Company, Chicago.

Natural Resources Conservation Service
2010 *Web Soil Survey*. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Electronic document. http://websoilsurvey.nrcs.udsda.gov/app/WebSoilSurvey.aspx, accessed 9 August 2010.

Schwegman, John E.
1984 *Comprehensive Plan for the Illinois Nature Preserves System. Part 2: The Natural Divisions of Illinois*. Illinois Nature Preserves Commission, Springfield.

State of Illinois
1984 Archives Division Public Domain Sales Land Tract Record Listing. On file at the Illinois State Archives, Springfield.

United States General Land Office
1834 Survey Plat of Township 14 North, Range 8 East. On file at the Illinois State Archives, Springfield.

United States Geological Survey
1935 Arcola 15' Quadrangle Map. United States Geological Survey, Washington, D.C.
1983 Arcola 7.5' Quadrangle Map. United States Geological Survey, Washington, D.C.

Walz, Gregory R.
1996 *Archaeological Reconnaissance of 15 Acres for the Proposed Arcola Industrial Park Expansion in Douglas County, Illinois*. Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 23 April 1996.
1997 *Archaeological Reconnaissance of 69 Acres for Proposed Commercial Development in Tuscola, Douglas County, Illinois*. Public Service Archaeology Program. Archaeological Survey Short Report submitted to the Illinois Historic Preservation Agency, Springfield, 7 April 1997.

W. R. Brink and Company
1875 *An Illustrated Historical Atlas Map of Douglas County, Ill.* W. R. Brink and Company, Chicago.

PROJECT CORRESPONDENCE

Illinois Historic Preservation Agency

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

Douglas County
Arcola
South of E 300 North and west of I-57
Libman Wind Turbine Project

PLEASE REFER TO: IHPA LOG #004072110

July 22, 2010

Mr. Wes Slaymaker, P.E.
WES Engineering Inc.
President
706 South Orchard Street
Madison, Wisconsin 53715

Dear Sir:

Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966 (16 USC 470), as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

The project area has not been surveyed and may contain prehistoric/historic archaeological resources. Accordingly, a Phase I archaeological reconnaissance survey to locate, identify, and record all archaeological resources within the project area will be required. This decision is based upon our understanding that there has not been any large scale disturbance of the ground surface (excluding agricultural activities) such as major construction activity within the project area which would have destroyed existing cultural resources prior to your project. If the area has been heavily disturbed prior to your project, please contact our office with the appropriate written and/or photographic evidence.

The area(s) that need(s) to be surveyed include(s) all area(s) that will be developed as a result of the issuance of the federal agency permit(s) or the granting of the federal grants, funds, or loan guarantees that have prompted this review.

Enclosed you will find an attachment briefly describing Phase I surveys and a list of archaeological contracting services. THE IHPA LOG NUMBER OR A COPY OF THIS LETTER SHOULD BE PROVIDED TO THE SELECTED PROFESSIONAL ARCHAEOLOGICAL CONTRACTOR TO ENSURE THAT THE SURVEY RESULTS ARE CONNECTED TO YOUR PROJECT PAPERWORK.

If you have further questions, please contact Joseph S. Phillippe, Chief Archaeologist at 217/785-1279.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

AEH

Enclosure

October 4, 2010

Anne E. Haaker
Deputy State Historic Preservation Officer
Preservation Services Division
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

RE: Libman Wind Project, Arcola, IL

Dear Ms. Haaker:

Attached is the report prepared by the department of Anthropology at University of Illinois, Urbana for the Libman Wind project adjacent to Arcola, IL in Douglas County. The turbine, access road and underground wires all lie within the surveyed area. The turbine location has been modified slightly since the last correspondence and is now approximately 900' South of County Rd 300 N.

The project has received a federal grant and requires an Environmental Assessment (EA). Please reply with a letter of concurrence on the "no-impact" of this project on cultural resources. Please feel free to call or email for further information. Thank you.

Sincerely,

Wes Slaymaker, P.E.
President
wes@WESengineering.com
WES Engineering Inc.
706 S. Orchard St
Madison, WI 53715
608-259-9304

Photo 1- Libman turbine location and 1000' radius buffer (green circle)

Figure 1- Libman Facility and proposed turbine location to the North.

Illinois Historic Preservation Agency

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

Douglas County PLEASE REFER TO: IHPA LOG #004072110
Arcola
South of E 300 North and west of I-57,

DOE,
Libman Wind Turbine Project

October 12, 2010

Wes Slaymaker
W.E.S. Engineering Inc.
706 S. Orchard St.
Madison, WI 53715

Dear Mr. Slaymaker:

Acre(s): 17.2 Site(s): 0
Archaeological Contractor:PSAP

Thank you for submitting the results of the archaeological reconnaissance. 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 archaeological Phase I reconnaissance report performed for the project referenced above. The Phase I survey and assessment of the archaeological resources appear to be adequate. Accordingly, we have determined, based upon this report, that no significant historic, architectural, and archaeological resources are located in the project area.

Please submit a copy of this letter with your application to the state or federal agency from which you obtain any permit, license, grant, or other assistance. Please retain this letter in your files as evidence of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer
AEH

Cc Kevin McGowen

Attachment C-3
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-14505-OE

Issued Date: 10/18/2010

Wes Slaymaker
WES Engineering Inc.
706 S. Orchard St.
Madison, WI 53715

**** 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 Lib01
Location:	Arcola, IL
Latitude:	39-41-33.50N NAD 83
Longitude:	88-17-50.68W
Heights:	406 feet above ground level (AGL)
	1070 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 04/18/2012 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-14505-OE.

Signature Control No: 131997853-132245288 (DNE -WT)
Michael Blaich
Specialist

Attachment C-4

National Telecommunications and Information Administration

Attachments can contain viruses that may harm your computer. Attachments may not display correctly.

Ferro, James

From:	Jediny, John [John.Jediny@ee.doe.gov]	Sent:	Fri 7/2/2010 12:42 PM
To:	'Joyce Henry'		
Cc:	'Edward M. Davison'; 'Yerace, Pete'; Ferro, James; Mann, Caroline		
Subject:	RE: DOE ARRA- Office of Weatherization Wind Projects		
Attachments:	NTIA- Sauk Valley CC (Final).pdf(715KB) NTIA- Libman Company (Final).pdf(3MB)		

Hello Joyce and Edward,

I have attached 2 Wind Energy projects for IRAC notification. Please let us know if there are any issues with the format or information and we will correct accordingly. Thank you for your time and help regarding these ARRA funded projects. Have a great July 4th weekend.

Thank you,

John Jediny
Environmental Specialist
Energy Efficiency and Renewable Energy (OIBMS)
John.Jediny@ee.doe.gov
Office - (202) 586-4790
Blackberry - (202) 465-0045
Forrestal- 5H-095

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

---

From: Joyce Henry [mailto:JHenry@ntia.doc.gov]
Sent: Wednesday, June 16, 2010 9:52 AM
To: Jediny, John
Subject: RE: DOE ARRA- Office of Weatherization Wind Projects
Importance: High

Mr. Jediny:

Thank you for submitting this info for review. Actually, you have included much more information than is necessary. As for your 24 projects; please submit them in the format of the template (all text, maps, and coordinates contained in 1 PDF file for each project: your coordinates do not have to be in MS Excel; a small MS Word table will do) that Mr. Ed Davison sent to you, on 6/7/2010. I have also attached a copy of same template for your convenience. Our goal is to streamline this voluntary process as keep it as simple as possible.

Please be advised that these projects will be distributed on the ListServ for agency review for a period of 45 calendar days each; after the review period is expired, I then have another 4-5 days to process and combine all responses received, and produce a NTIA Response Letter.

It would be highly advisable that you submit 2 or 3 projects every 2-3 days; turbine projects are an additional duty for me, as well as the other reviewers. If I pushed to the ListServ all the 24 projects at once, they would ALL be due on the same day, and that would cause a gigantic uproar among the reviewers. Thank you for your consideration.

Joyce C. Henry

202-482-1850/51 (office)

202-482-4396 (fax)

From: Jediny, John [mailto:John.Jediny@ee.doe.gov]
Sent: Tuesday, June 15, 2010 11:10 AM
To: Joyce Henry
Cc: Edward M. Davison
Subject: DOE ARRA- Office of Weatherization Wind Projects

Hi Joyce,

This is the spreadsheet we currently have; I have also provided a cross-reference section that matches the spreadsheet to the .pdf project files. Please let me know if this format and setup will work for your needs, obviously we can arrange the format however you would prefer. Thank you again for your time, we undertook this effort of compiling the information in one location with the hopes it would make your lives easier on your end. Please let me know if you have any comments, questions, or concerns. I have attached two of the project files for your review as well.

Thank you again,

John Jediny

Environmental Specialist

Energy Efficiency and Renewable Energies (OIBMS)

John.Jediny@ee.doe.gov

Office - (202) 586-4790

Blackberry - (202) 465-0045

Rm- 5H-095

Date: 7/2/2010

Type of Notification: NEW

Project: Libman Company Wind Energy Project

County: Douglas

State: Illinois

Project Sponsor: U.S Department of Energy: Energy Efficiency and Renewable Energy

DOE NEPA Document Manager:

John Jediny
John.Jediny@ee.doe.gov
Work- (202) 586-4790
Mobile - (202) 465-0045

DOE Support NEPA Document Manager:

Jim Ferro
Jim.Ferro@ee.doe.gov
Work- (703) 218-2546
Mobile- (703) 231-0501

DOE Mailing Address:

John Jediny (EE-3C)
1000 Independence Ave., SW
Washington, DC 20585
Room: 5H-095

Turbine Description:

Number of Turbines:	1
Turbine Size:	1.5 MW
Turbine Hub Height AGL (meters):	85
Turbine Blade Diameter (meters):	77
Maximum Blade Tip Height AGL (meters):	122

(X) :Turbine Locations:

GPS: 39.694173, -88.297269 (Google Earth)

Street Address: 220 N. Sheldon St., Arcola, IL

Turbines	Latitude	Longitude
Turbine #1	39.694173	-88.297269

Not Applicable: Wind Farm Boundary Points:

If the specific locations of the turbines have not been selected, identify the boundaries of an area that will contain the proposed facility. Using latitude/ longitude coordinates, complete a polygon that will enclose the potential turbine locations.

Potential Turbine Boundary	Latitude	Longitude

Maps: PLEASE SEE ATTACHED

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

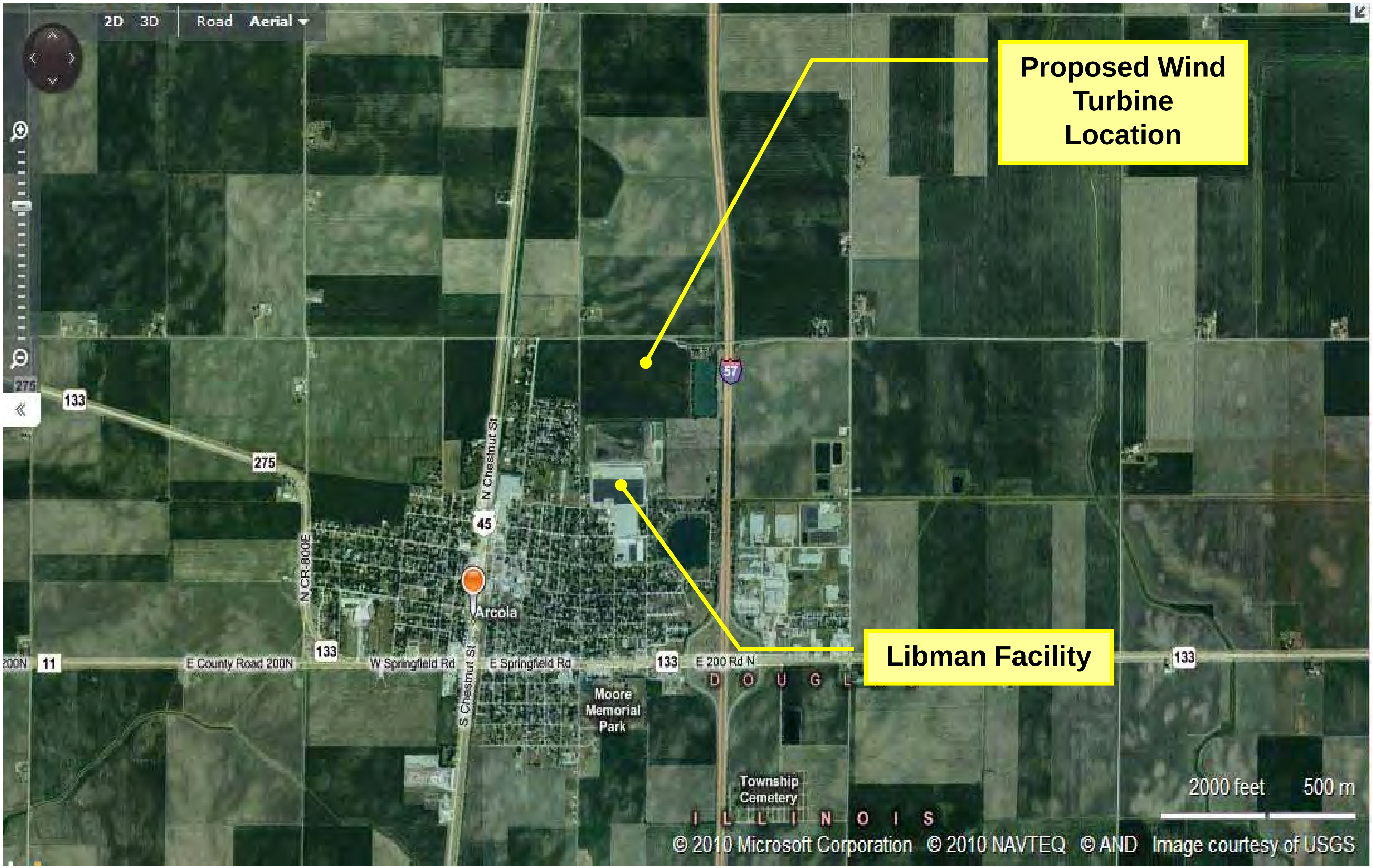

Shonkwiler
457 ft
T1 Alt
Libman Equip
Met Tower
Libman
199.2
0 ft
500 ft
1000 ft
1500 ft
2500 ft
3000 ft

FIGURE 1

Aerial image of Libman facilities with approximate turbine location indicated

Figure 2

Aerial Image with Proposed Wind Turbine Location



LEGEND

- PROPERTY / TITLE / R.O.W. LINE
- FENCE
- [illegible]
- [illegible]
- ELECTRIC, [illegible], W/ POWER POLE
- GAS LINE, [illegible]
- SANITARY SEWER
- [illegible]
- FIBER OPTIC, [illegible]
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- [illegible]
- PROPOSED WIND TURBINE GENERATOR

NORTH

1 INCH = [illegible] FEET ON 22" X 34" SHEET.

SOURCE OF BASE MAP

1. TOPOGRAPHIC MAP, SITE FEATURES AND PROPERTY LINES CONTAINED IN [illegible] AND [illegible], ORIGINALLY PREPARED BY [illegible], CLANCY AND ASSOCIATES, P.C., [illegible], ILLINOIS, AND PROVIDED BY [illegible].
2. AERIAL PHOTO [illegible] MAP [illegible] ORTHOPHOTO QUARTER QUADRANGLES AVAILABLE AT THE ILLINOIS NATURAL RESOURCES GEOSPATIAL DATA CLEARINGHOUSE WEBSITE.
3. COORDINATE SYSTEM IS ILLINOIS STATE PLANE, EAST ZONE, NAD 83(86). VERTICAL DATUM IS NAVD 88.
4. [illegible] THE BASE MAP. CONTRACTORS PERFORMING WORK AT THE SITE SHALL CONFIRM CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY OWNER OF DISCREPANCIES.

CONSTRUCTION COORDINATES

PT NO.	GEOGRAPHIC, NAD 83/84		SPC, IL EAST, NAD 83/84	
	LATITUDE	LONGITUDE	NORTHING	EASTING
WTG	[illegible]	[illegible]	[illegible]	[illegible]

COORDINATE CONVERSION FROM LAT-LONG TO SPC MADE USING U.S. ARMY CORPS OF ENGINEERS SOFTWARE - CORPSCON, [illegible] AND VALUES ROUNDED TO NEAREST [illegible] FT.

LIBMAN

LOCATOR PLAN (WITH ORTHOPHOTO)

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

SHEET 1

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

AUG 25 2010

Mr. John Jediny (EE-3C)
Department of Energy
1000 Independence Ave., SW
Room 5H-095
Washington, DC 20585

Re: Libman Company Wind Project, in Douglas County, IL

Dear Mr. Jediny:

In response to your request on July 2, 2010, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the Libman Company Wind Project, located in Douglas 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
Deputy Associate Administrator
Office of Spectrum Management

Attachment C-5
United States Fish and Wildlife Service

NRC
Natural Resources Consulting, Inc.

1900 Wazee Street | Suite 200 | Denver, CO 80202
Ph: 720.330.7280 | Fax: 720.382.1966

www.nrcdifference.com

May 14, 2010

Mr. Matthew Sailor
U.S. Fish and Wildlife Service
Rock Island Illinois Field Office
1511 47th Avenue
Moline, Illinois 61265

RE: Libman Wind Single Wind Turbine Project – Arcola, Illinois (Douglas County)

Dear Mr. Sailor

Natural Resources Consulting has prepared this letter on behalf of the Libman Wind Turbine Company, LLC (Libman Wind) and is requesting concurrence from the U.S. Fish and Wildlife Service (USFWS) that the proposed Libman single turbine wind energy project is *not likely to adversely affect* the Indiana bat (*Myotis sodalis*) and will have *no effect* on the Eastern prairie fringed orchid (*Platanthera leucophaea*). The proposed wind energy development project is located in Douglas County, Illinois. Libman Wind has applied to receive federal grant money from the Department of Energy (DOE) in support of this effort and this represents the federal agency nexus for this project.

Libman Wind is proposing to construct a single wind turbine energy project in Douglas County, Illinois. The proposed project site is located immediately north of the Libman companies manufacturing plant near Arcola, Illinois. The project consists of a single 1.5 megawatt (MW) wind turbine, and associated gravel access road, and underground electrical transmission to the interconnection switchgear associated with the Libman Company manufacturing plant located immediately adjacent to the proposed project site. The proposed project area is an active agricultural field (approximately 40 acres) located adjacent to the Libman Company facilities. Mature trees or undisturbed habitats do not occur on the site. The proposed wind energy project would provide electricity to the nearby Libman manufacturing plant to reduce the commercial electrical needs of the facility and to lower the carbon footprint associated with products made at the plant. The project proponent anticipates replacing up to 30 percent of its electric usage with renewable energy generated onsite.

Based on the lack of known occurrences or suitable habitat at the proposed project location for either federally-listed species known to occur in Douglas County, Illinois, no species specific conservation measures or mitigation are needed or included in this project.

An NRC biologist performed several careful reviews (May 2010) of the USFWS Section 7 Consultation website (http://www.fws.gov/midwest/Endangered/section7/index.html) and reviewed the list of species and critical habitat that "may be present" in the project area. Two federally-listed species are listed for Douglas County, Illinois: Indiana bat and Eastern prairie fringed orchid.

The Indiana bat relies on caves and mines as hibernacula for suitable winter hibernation sites. During summer months, the Indiana bat either colonially, individually, or in small groups roosts under exfoliating bark of large dead trees. Typically roost trees are associated with forest gaps, fence lines, or along wooded edges. Maternal roosts may occur in riparian zones, bottomland and floodplain habitats, wooded wetlands, and associated upland communities. Foraging habitat is typically semi-open to close forested habitats, forest edges, and riparian areas. A review of the *Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision (USFWS; April 2007)* indicates no summer records of the Indiana bat in Douglas County, Illinois and the nearest known hibernaculum and designated critical habitat is in Greene County, Indiana (Priority 1 hibernaculum); more than 100 miles east of the proposed project. A search of the Illinois Department of Natural Resources EcoCAT database did not indicate any records of this species in the vicinity of the proposed project. The proposed project site does not include suitable wintering (hibernacula), summer (maternal roosting habitat), or highly suitable foraging habitat for this species.

Based on the lack of known occurrence of this species or suitable habitats (hibernacula or summer roosting habitat) at or near the proposed project site, the likelihood that this project will affect individuals of this species or suitable habitats is considered low. However, the risk to migrating individuals is more difficult to characterize because little is known about the migratory patterns of this species. Based on this uncertainty, it is appropriate to conclude that the proposed project may affect, but is **Not Likely to Adversely Affect** the Indiana bat based on the discountable effects on migrating individuals.

The Eastern prairie fringed orchid is a perennial herb that occurs in a variety of habitats including mesic prairie, sedge meadows, marsh edges, and bogs. The proposed project area is an agricultural plot and does not include native habitats or any undisturbed habitats that would be potentially suitable for this species. A search of the Illinois Department of Natural Resources EcoCAT database did not indicate any records of this species in the vicinity of the proposed project.

Based on the lack of suitable habitat in the proposed project area and no known occurrences of this species in the project area, implementation of the proposed project would have **No Effect** on this species.

In summary, the USFWS is requested to provide concurrence with the following determinations:

- Indiana bat: May affect, but not likely to adversely affect, based on discountable effects.
- Eastern prairie fringed orchid: No effect

Please contact me by email (SFaulk@nrc-inc.net) or by phone (720.330.7280) if you have any questions or need more information.

Sincerely,

Natural Resources Consulting, Inc.

Steven Faulk
Biologist

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

June 10, 2010

Mr. Steven Faulk
Biologist
Natural Resources Consulting, Inc.
1900 Wazee St., Suite 200
Denver, Colorado 80202

Dear Mr. Faulk:

We have reviewed the Biological Assessment Report (Report) dated May 14, 2010 prepared by Natural Resources Consulting, Inc. for the Libman Wind Turbine Company (Libman Wind) wind turbine development project in Douglas County, Illinois. Libman Wind plans to install a 1.5 MW wind turbine, as well as access roads and an underground electrical collection system immediately north of their manufacturing plant in Arcola, Illinois. Libman Wind is applying to receive a grant through the United States Department of Energy (DOE) as part of the American Recovery and Reinvestment Act Community Renewable Energy Program. As the grantor, DOE is the Federal action agency. We have the following comments.

We understand from the Report that there is no suitable habitat in the project area for the federally listed eastern prairie fringed orchid (*Platanthaera leucophaea*). The project site is previously disturbed, agricultural field. We concur with your determination that the proposed project will have no effect on this species.

In regard to the federally listed endangered Indiana bat (*Myotis sodalis*), there are no collection records for this species in Douglas County. We understand that no suitable roost trees occur within the project area and such, you have determined the action is not likely to adversely affect summering Indiana bats. The project boundary is located more than 2.5 miles (average maximum foraging distance of summering Indiana bats) away from the nearest potential maternity habitat, but does contain some less desirable Indiana bat foraging habitat to the east. Nonetheless, no continuity exists between this habitat, the nearest maternity habitat, and the project site providing no pathway for take of this endangered species during the summer. Open expanses greater than 1000 feet are not typically spanned by foraging Indiana bats. Therefore, even though suitable habitat exists in the project vicinity, it is unlikely the habitat will be utilized as it is part of a non-contiguous landscape. Based on this information, we concur with your determination that the proposed project is not likely to adversely affect the Indiana bat during summer activities.

Additionally, the placement of the single turbine is also not adjacent to any known migratory areas, refuges, major flyways, or known nesting areas, and the turbine is of tubular monopole design. Therefore, we concur this project is not likely to adversely affect migrating listed bats and that the likelihood for take is discountable.

We recommend that the DOE encourage "Renewable Energy Grant Funds" grant recipients to monitor wind turbines for impacts to birds and bats, and require notification to DOE and this office if operation of wind turbines results in mortality of these species. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated.

Thank you for the opportunity to provide comments. If you have any additional questions or concerns, please contact Matt Sailor of my staff at 309-757-5800, extension 216.

Sincerely,

Richard C. Nelson
Field Supervisor

s:\office users\matt\technical assistance\nrc\doesingleturbineconcurnlaa(libman,dougcoil).docx

Department of Energy
Washington, DC 20585

September 7, 2010

Richard C. Nelson
U.S. Fish and Wildlife Service
Rock Island Field Office
1511 47th Avenue
Moline, IL 61265

Subject: Section 7 Endangered Species Consultation
Libman Company Wind Turbine Project, Arcola, Douglas County, IL

Dear Mr. Nelson,

The U.S. Department of Energy (DOE) is requesting concurrence from the U.S. Fish and Wildlife Service (FWS) that the proposed Libman Company Wind Energy Project (Project), in Arcola, Douglas County, Illinois *is not likely to adversely affect* the Indiana bat (*Myotis sodalist*) and would have *no effect* on the Eastern prairie fringed orchid (*Platanthera leucophaea*). This request is being submitted after close consultation with Mr. Jeff Gosse in the FWS Midwest Region/Region 3 Office on the process for DOE "Recovery Act" funded wind power projects.

DOE is proposing to provide federal funding to the Illinois Department of Commerce and Economic Opportunity (DCEO) for this project. The Libman Company is proposing to install a single 1.5 megawatt (MW) Vensys wind turbine on an 85-m tower (279 feet) and having a total turbine height of 126 m (415 feet). This project will require a gravel access road and underground electrical transmission equipment to interconnection switchgear on Libman Company property located immediately north of their manufacturing facility in Arcola, Douglas County, IL.

On May 14, 2010, Mr. Steve Faulk of Natural Resources Consulting (NRC), the Libman Company's environmental consultant, submitted a Biological Assessment Report to the USFWS Rock Island Field Office (copy attached) describing the proposed project and project area, and requesting concurrence with the determination that the proposed single turbine wind energy project is not likely to adversely affect the Indiana bat, federally-listed Endangered, and will have no effect on the Eastern prairie fringed orchid, federally-listed Threatened. The report provided an assessment of the two listed species and justification for the proposed affect determination. DOE has reviewed the FWS) Environmental Conservation Online System to verify that there is no known critical habitat present at the project site. DOE has also confirmed that there are no other threatened, endangered, or candidate species listed for Douglas County from the FWS Midwest Region 3 Section 7(a)(2) Technical Assistance Website. DOE has reviewed the relevant project information and agrees with the determinations reached by Mr. Faulk.

On June 10, 2010, the FWS responded (copy attached) to the May 2010 NRC letter, providing written concurrence with the determination that that the proposed project would have no effect on the Eastern prairie fringed orchid and that the project is not likely to adversely affect the Indiana bat.

Please be advised, on July 1, 2010, DOE was informed that the proposed turbine location was relocated approximately 1,000 feet north from the initially proposed location (figures attached). The new location is also contiguous to active agricultural land owned by Libman, and as with the previous location, mature trees and/or undisturbed habitats do not occur on the site.

Pursuant to the requirements under Section 7(a) (2) of the Endangered Species Act and the FWS implementing regulations (50 CFR Part 402), DOE respectfully requests concurrence with the determination that the installation and operation of the Libman Company Wind Turbine project in Douglas County is not likely to adversely affect the Indiana bat and will have no effect on the Eastern prairie fringed orchid or any other federally-listed threatened, endangered, proposed, or candidate species, or their critical habitat. It is DOE's opinion that review and concurrence on this project does not negate the comprehensive approach for evaluation of these types of projects as a group. DOE is respectfully requesting concurrence as expeditiously as possible for this DOE "Recovery Act" funded project. DOE appreciates the importance USFWS is placing on all of the reviews of the DOE "Recovery Act" funded projects as we understand the matter was discussed during the September 1, 2010 Region 3 – Field Office meeting.

DOE is preparing a Draft Environmental Assessment for the project. You will be given the opportunity to review and comment on this document when it is available.

Please contact the DOE Document Manager Mr. John Jediny at 202-586-4790 or John.Jediny@ee.doe.gov or the NEPA Compliance Officer Mr. Pete Yerace at 513-218-4069 or Pete.Yerace@emcbc.doe.gov with any questions regarding this consultation.

Sincerely,

Pete Yerace
NEPA Compliance Officer

Enclosures:
Figures
NRC Biological Assessment Report
USFWS response letter

cc: Mr. Jeff Gosse, USFWS Region 3 (w/ attachments)
Mr. Matthew Sailor, USFWS Region 3 (w/ attachments)
Ms. Heidi Woeber, USFWS Region 3 (w/ attachments)

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

June 10, 2010

Mr. Steven Faulk
Biologist
Natural Resources Consulting, Inc.
1900 Wazee St., Suite 200
Denver, Colorado 80202

Dear Mr. Faulk:

We have reviewed the Biological Assessment Report (Report) dated May 14, 2010 prepared by Natural Resources Consulting, Inc. for the Libman Wind Turbine Company (Libman Wind) wind turbine development project in Douglas County, Illinois. Libman Wind plans to install a 1.5 MW wind turbine, as well as access roads and an underground electrical collection system immediately north of their manufacturing plant in Arcola, Illinois. Libman Wind is applying to receive a grant through the United States Department of Energy (DOE) as part of the American Recovery and Reinvestment Act Community Renewable Energy Program. As the grantor, DOE is the Federal action agency. We have the following comments.

We understand from the Report that there is no suitable habitat in the project area for the federally listed eastern prairie fringed orchid (*Platanthaera leucophaea*). The project site is previously disturbed, agricultural field. We concur with your determination that the proposed project will have no effect on this species.

In regard to the federally listed endangered Indiana bat (*Myotis sodalis*), there are no collection records for this species in Douglas County. We understand that no suitable roost trees occur within the project area and such, you have determined the action is not likely to adversely affect summering Indiana bats. The project boundary is located more than 2.5 miles (average maximum foraging distance of summering Indiana bats) away from the nearest potential maternity habitat, but does contain some less desirable Indiana bat foraging habitat to the east. Nonetheless, no continuity exists between this habitat, the nearest maternity habitat, and the project site providing no pathway for take of this endangered species during the summer. Open expanses greater than 1000 feet are not typically spanned by foraging Indiana bats. Therefore, even though suitable habitat exists in the project vicinity, it is unlikely the habitat will be utilized as it is part of a non-contiguous landscape. Based on this information, we concur with your determination that the proposed project is not likely to adversely affect the Indiana bat during summer activities.

Additionally, the placement of the single turbine is also not adjacent to any known migratory areas, refuges, major flyways, or known nesting areas, and the turbine is of tubular monopole design. Therefore, we concur this project is not likely to adversely affect migrating listed bats and that the likelihood for take is discountable.

We recommend that the DOE encourage "Renewable Energy Grant Funds" grant recipients to monitor wind turbines for impacts to birds and bats, and require notification to DOE and this office if operation of wind turbines results in mortality of these species. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated.

Thank you for the opportunity to provide comments. If you have any additional questions or concerns, please contact Matt Sailor of my staff at 309-757-5800, extension 216.

Sincerely,

Richard C. Nelson
Field Supervisor

s:\office users\matt\technical assistance\nrc\doesingleturbineconcurnlaa(libman,dougcoil).docx

NRC
Natural Resources Consulting, Inc.
1900 Wazee Street | Suite 200 | Denver, CO 80202
Ph: 720.330.7280 | Fax: 720.382.1966
www.nrcdifference.com

May 14, 2010

Mr. Matthew Sailor
U.S. Fish and Wildlife Service
Rock Island Illinois Field Office
1511 47th Avenue
Moline, Illinois 61265

RE: Libman Wind Single Wind Turbine Project – Arcola, Illinois (Douglas County)

Dear Mr. Sailor

Natural Resources Consulting has prepared this letter on behalf of the Libman Wind Turbine Company, LLC (Libman Wind) and is requesting concurrence from the U.S. Fish and Wildlife Service (USFWS) that the proposed Libman single turbine wind energy project is *not likely to adversely affect* the Indiana bat (*Myotis sodalis*) and will have *no effect* on the Eastern prairie fringed orchid (*Platanthera leucophaea*). The proposed wind energy development project is located in Douglas County, Illinois. Libman Wind has applied to receive federal grant money from the Department of Energy (DOE) in support of this effort and this represents the federal agency nexus for this project.

Libman Wind is proposing to construct a single wind turbine energy project in Douglas County, Illinois. The proposed project site is located immediately north of the Libman companies manufacturing plant near Arcola, Illinois. The project consists of a single 1.5 megawatt (MW) wind turbine, and associated gravel access road, and underground electrical transmission to the interconnection switchgear associated with the Libman Company manufacturing plant located immediately adjacent to the proposed project site. The proposed project area is an active agricultural field (approximately 40 acres) located adjacent to the Libman Company facilities. Mature trees or undisturbed habitats do not occur on the site. The proposed wind energy project would provide electricity to the nearby Libman manufacturing plant to reduce the commercial electrical needs of the facility and to lower the carbon footprint associated with products made at the plant. The project proponent anticipates replacing up to 30 percent of its electric usage with renewable energy generated onsite.

Based on the lack of known occurrences or suitable habitat at the proposed project location for either federally-listed species known to occur in Douglas County, Illinois, no species specific conservation measures or mitigation are needed or included in this project.

An NRC biologist performed several careful reviews (May 2010) of the USFWS Section 7 Consultation website (http://www.fws.gov/midwest/Endangered/section7/index.html) and reviewed the list of species and critical habitat that “may be present” in the project area. Two federally-listed species are listed for Douglas County, Illinois: Indiana bat and Eastern prairie fringed orchid.

The Indiana bat relies on caves and mines as hibernacula for suitable winter hibernation sites. During summer months, the Indiana bat either colonially, individually, or in small groups roosts under exfoliating bark of large dead trees. Typically roost trees are associated with forest gaps, fence lines, or along wooded edges. Maternal roosts may occur in riparian zones, bottomland and floodplain habitats, wooded wetlands, and associated upland communities. Foraging habitat is typically semi-open to close forested habitats, forest edges, and riparian areas. A review of the *Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision (USFWS; April 2007)* indicates no summer records of the Indiana bat in Douglas County, Illinois and the nearest known hibernaculum and designated critical habitat is in Greene County, Indiana (Priority 1 hibernaculum); more than 100 miles east of the proposed project. A search of the Illinois Department of Natural Resources EcoCAT database did not indicate any records of this species in the vicinity of the proposed project. The proposed project site does not include suitable wintering (hibernacula), summer (maternal roosting habitat), or highly suitable foraging habitat for this species.

Based on the lack of known occurrence of this species or suitable habitats (hibernacula or summer roosting habitat) at or near the proposed project site, the likelihood that this project will affect individuals of this species or suitable habitats is considered low. However, the risk to migrating individuals is more difficult to characterize because little is known about the migratory patterns of this species. Based on this uncertainty, it is appropriate to conclude that the proposed project may affect, but is **Not Likely to Adversely Affect** the Indiana bat based on the discountable effects on migrating individuals.

The Eastern prairie fringed orchid is a perennial herb that occurs in a variety of habitats including mesic prairie, sedge meadows, marsh edges, and bogs. The proposed project area is an agricultural plot and does not include native habitats or any undisturbed habitats that would be potentially suitable for this species. A search of the Illinois Department of Natural Resources EcoCAT database did not indicate any records of this species in the vicinity of the proposed project.

Based on the lack of suitable habitat in the proposed project area and no known occurrences of this species in the project area, implementation of the proposed project would have **No Effect** on this species.

In summary, the USFWS is requested to provide concurrence with the following determinations:

- Indiana bat: May affect, but not likely to adversely affect, based on discountable effects.
- Eastern prairie fringed orchid: No effect

Please contact me by email (SFaulk@nrc-inc.net) or by phone (720.330.7280) if you have any questions or need more information.

Sincerely,

Natural Resources Consulting, Inc.

Steven Faulk
Biologist

Biological Assessment - NEPA EISs

May 2010

Prepared by Wes Slaymaker, P.E.

Project Engineer
Libman Wind Turbine Company LLC

Table of Contents

1. Executive Summary

.1 **Project Overview –**Libman Wind Turbine Company LLC "Libman Wind", is a renewable energy project in Douglas County, IL in a farm field North of the Libman companies manufacturing plant on the edge of the City of Arcola along Interstate 57. The projects consists of one large 1.5MW wind turbine, and associated gravel access road and electrical wires buried underground to the interconnection switchgear of the manufacturing plant. The project area contains 40+ acres of farm fields adjacent the plant owned by Libman Equipment LLC. The project is using electricity generated by the turbine to reduce the electrical needs of the Libman manufacturing facility, and lower the carbon footprint of products made in that plant so they are more competitive in the marketplace. The plant is excited about replacing 30% of its electric usage with renewable energy generated onsite.

B. Project Description

1. **Project Location** – The Project is located on 40 acres of agricultural land in Douglas County, IL. A location is shown in figures __ & __ in Attachment 1. The site is an elevated area of land that consists of large crop fields used to grow corn and soybeans. The site also includes some residences along the gravel or paved roads surrounding each section of land. The average elevation of the turbine site is just under 656 feet AMSL. This site is open to the prevailing winds. The turbine will need proper setbacks from nearby residences, in this case 1.1X the total height should be a sufficient setback distance from property boundaries as noise will not be an issue with the nearby Interstate. The location of the turbine in the middle of the field also places it in an area with the least obstruction to the free flow of the wind. A 1000 foot radius buffer is shown around the turbine, to show that no residences are within the 1000 foot radius.

Figure 1- Site photo from airplane, approx. turbine location marked indicated

Figure 2- Topo map closeup- with wind turbine location with yellow dot

Figure 3- Aerial with turbine, met tower and 150% of rotor radius setback from property line.

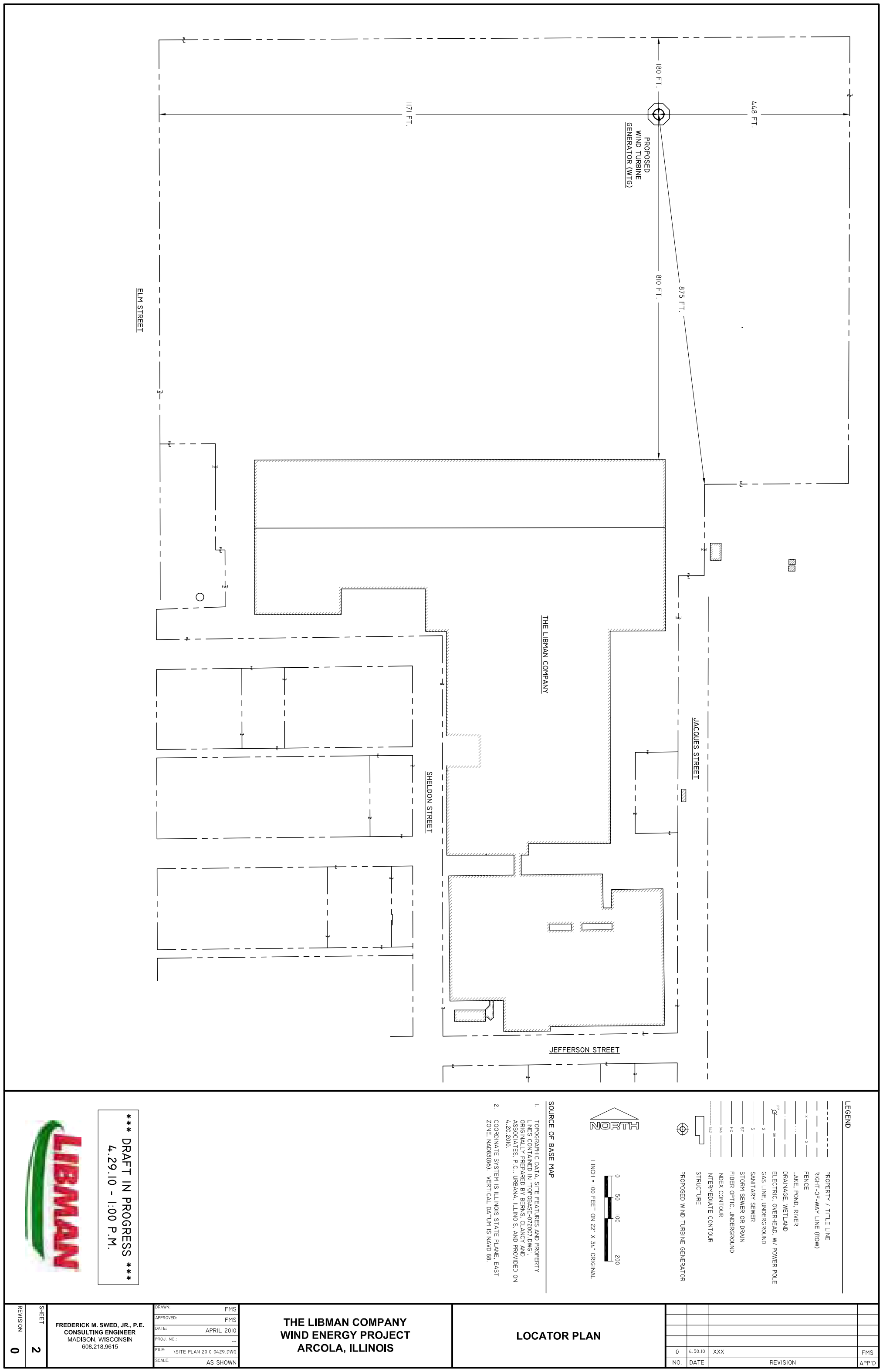


Figure 4- Site Plan with dimensions to lot lines

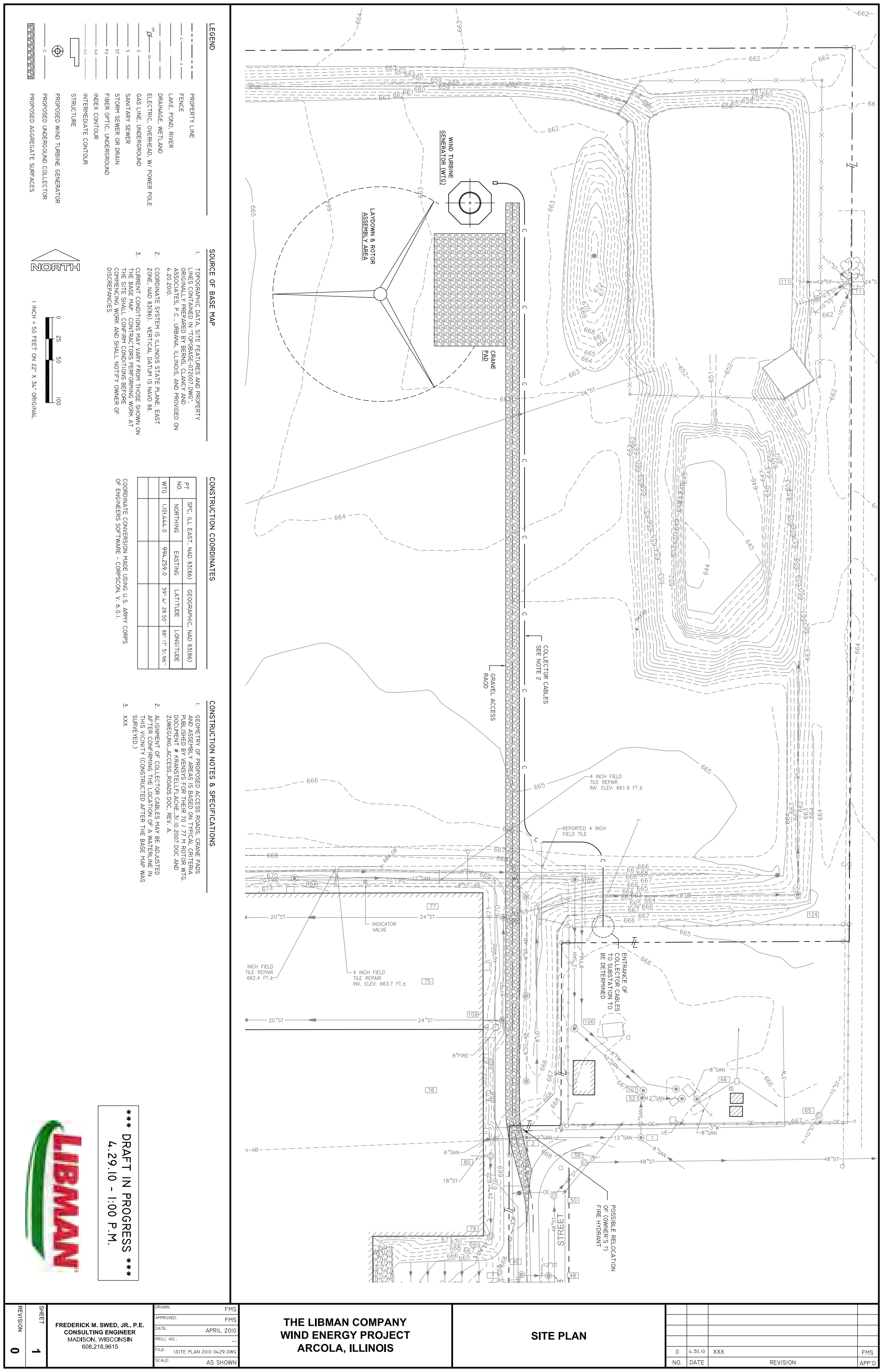


Figure 5- Site plan detail with contours, access road and underground wire route

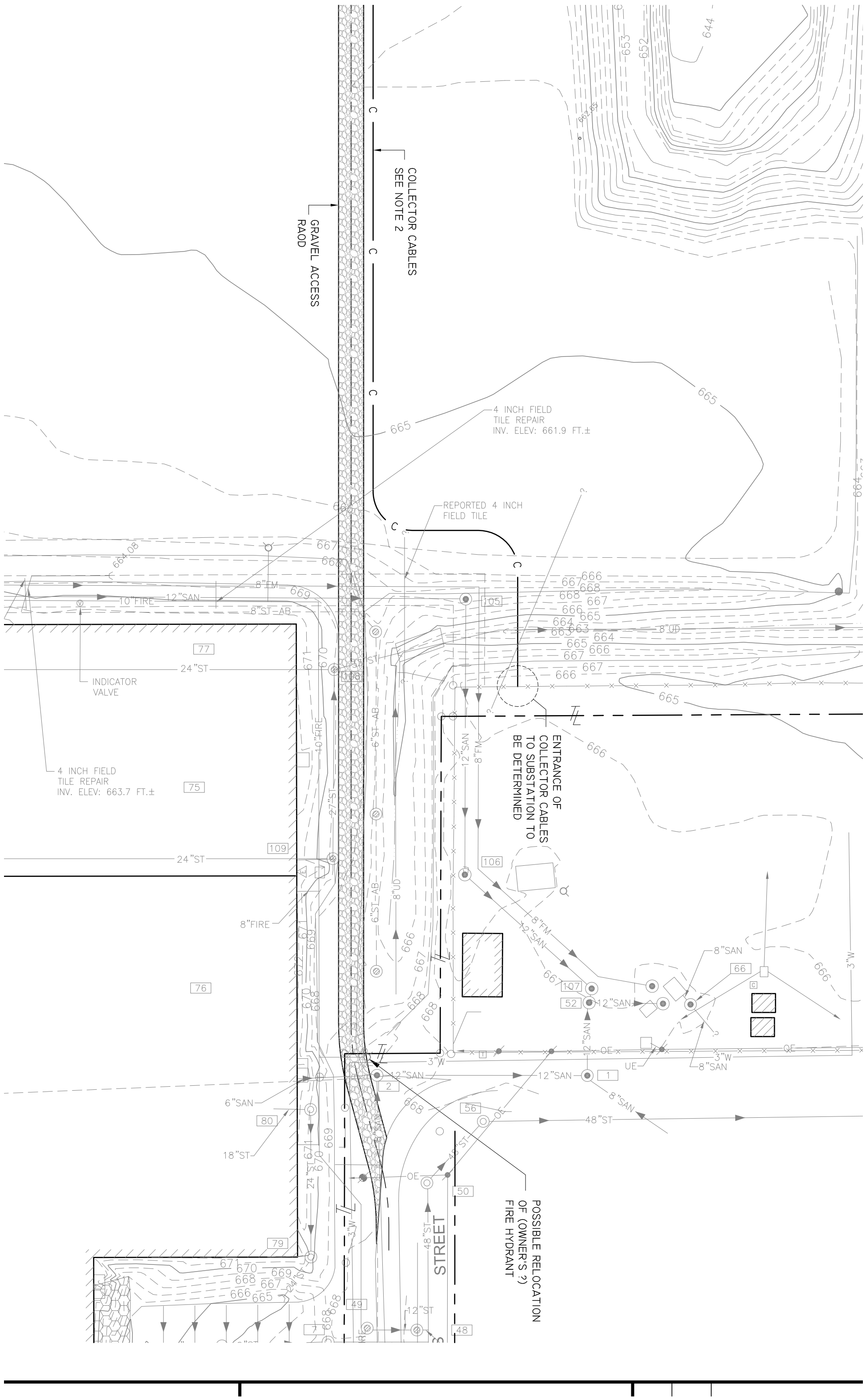


Figure 6- Site plan detail- electrical connection

2. Definition of Action Area: The project area and impact includes the wind turbine location, and the wires taking the electricity to the nearby electrical switchgear cabinet 1000’ south of the turbine, see Figures above. This 1000’ underground wire route will follow the edge of the access road, see Figure 6 above.

3. Proposed Action:

a. Describe the anticipated steps involved in the action in expected or logical order and include diagrams that are useful.

The project construction will consist of:

1. prepare for turbine foundation by installing pilings or geopiers if soil strength is below 3000 psf bearing capacity.
2. excavate turbine foundation area
3. install concrete and rebar foundation
4. install underground wire from wind turbine to the switchgear
5. bring a large crane to the site
6. deliver wind turbine components
7. erect turbine
8. commission project

b. Identify Best Management Practices (BMPs), Erosion and Sediment Control, and other measures (i.e. work windows, construction techniques, avoidance) designed to minimize effects in this section.

The project will use fabric erosion control fence to contain any runoff of materials in a rain event. There will be little disturbance of the area, as it is a construction debris landfill with existing gravel road access of sufficient size and strength to allow access of all the concrete trucks, and turbine components.

c. If sideboards are used for ancillary project components, either detail here or in an appendix. N/A

d. Describe mitigation, monitoring, and reporting plan, as well as conservation bank credits or mitigation sites.

A separate quality control firm will be used to assure the contractor performs all its duties according to specifications, including erosion control, and impact to areas outside that designated for the project.

C. Description of the species and their habitat

Identify each species and each critical habitat. Give brief rationales for "no effect" species if it was not included in Executive Summary. Include the following for species with other determinations (repeat for each listed species and listed habitat):

Below are the Cook County Federal listed Species:

SPECIES	LISTING STATUS	DETERMINATION
Indiana Bat	Endangered	Not likely to adversely affect
Eastern prairie fringed orchid	Threatened	No Effect

1. Consultation with local Fish and Game and/or Natural Heritage database

   Attached in Appendix A is letter from Illinois DNR explaining they feel the project will not likely have any adverse effects on sensitive species of concern.

Below are site pictures showing "project area." This site is currently farmed with corn or soybeans. The adjacent small pond is meant to capture runoff from the factory site and also has a large pumphouse for the emergency fire outdoor hydrants.

Picture 1- Turbine site looking South at Libman plant

Picture 2- Turbine site looking East at pumphouse

Picture 3- Turbine site looking North, green strip is property edge

Picture 4- Turbine site looking West at adjacent residential area

D. Environmental Baseline

The Libman project area is moderately disturbed area with very little native vegetation intact. The entire site is plowed annually for crops, with the ditches mowed several times a year for weed control.

E. Effects of the Action: Include discussion of direct and indirect effects relative to all species.

1. Direct Effects - Those effects caused directly by the proposed action

The direct effect of installing the wind turbine will be the possible collision of birds or insects on the tower or blades.

2. Indirect Effects - Caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur.

If there were nesting ground birds that did not like to have large objects towering over them then those birds would be affected.

3. Cumulative Effects - Those effects of future State or private activities, not Federal activities, that are reasonably certain to occur within the action area.

F. Determination of Effect

Below in the table the species are listed along with explanation of determination

SPECIES	EXPLANATION	DETERMINATION
Indiana Bat	The Libman project would be in a part of Illinois that may contain the Indiana bat, if there are Indiana bats in the project area there is a chance they could strike the turbine	Not likely to adversely affect
Eastern prairie fringed orchid	construction debris landfill site would be very unlikely to host a prairie fringed orchid	No Effect
Leafy-prairie clover	Site could later host but would not impact	No Effect

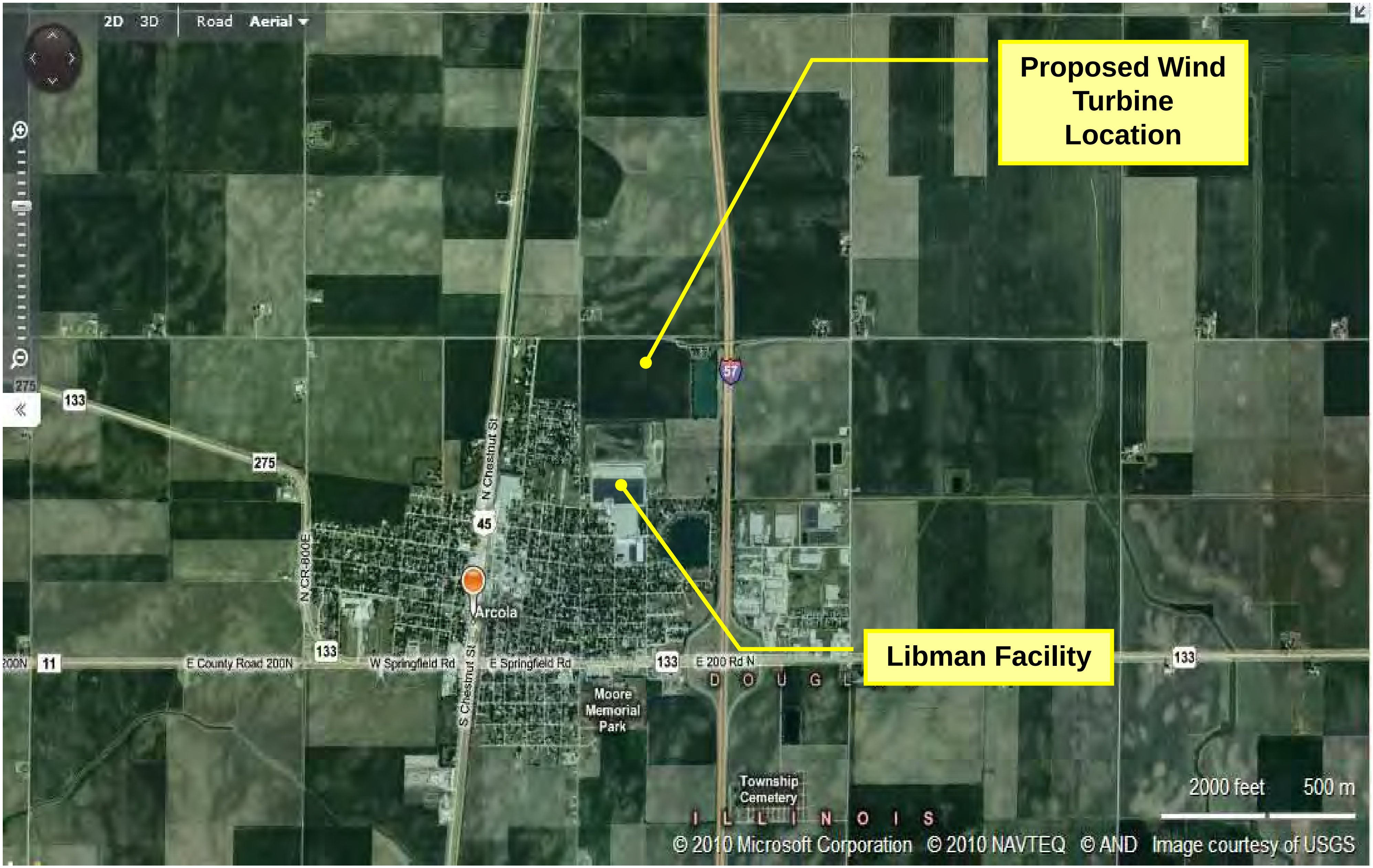
G. References and personal communications cited

Project Engineer has consulted with USFWS office in Illinois, and with Keith Shank of Illinois DNR.

Appendix A- IL DNR Letter

Figure 2

Aerial Image with Proposed Wind Turbine Location



LEGEND

PROPERTY / TITLE / R.O.W. LINE

FENCE

PROPOSED WIND TURBINE GENERATOR

NORTH

SOURCE OF BASE MAP

CONSTRUCTION COORDINATES

	LATITUDE	LONGITUDE	NORTHING	EASTING

LOCATOR PLAN
(WITH ORTHOPHOTO)

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

LIBMAN

SHEET 1

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

September 10, 2010

Mr. Pete Yerace
NEPA Compliance Officer
Department of Energy
Washington, DC 20585

Dear Mr. Yerace:

We have reviewed your letter dated September 3, 2010, regarding the Libman Company Wind Turbine Project, Douglas County, Illinois. Libman Company plans to install a single wind turbine at their manufacturing facility in Arcola, Illinois. The 1.5 megawatt Vensys turbine will be 415 feet tall. The project will require a gravel access road, and underground electrical transmission equipment. Libman Company is applying to receive a grant through the United States Department of Energy (DOE) as part of the American Recovery and Reinvestment Act Community Renewable Energy Program. As the grantor, DOE is the Federal action agency. We have the following comments.

We understand from the letter and from the Biological Assessment Report (Report) dated May 14, 2010, prepared by Natural Resources Consulting, Inc., that there is no suitable habitat in the project area for the federally listed eastern prairie fringed orchid (*Platanthera leucophaea*). The proposed Libman Company site is previously disturbed agricultural field. We concur with your determination that the proposed project will have no effect on these species.

In regard to the federally listed endangered Indiana bat (*Myotis sodalis*), there are no collection records for this species in Douglas County. We understand that the turbine site has been relocated approximately 1,000 feet north from the initially proposed site. The Report states that no suitable roost trees occur within the project area and because of this you have determined the action is not likely to adversely affect summering Indiana bats. The project boundary is located more than 2.5 miles (average maximum foraging distance of summering Indiana bats) away from the nearest potential maternity habitat, but does contain some less desirable Indiana bat foraging habitat to the east. However, no continuity exists between this habitat, the nearest maternity habitat, and the project site providing no pathway for take of this endangered species during the summer. Open expanses greater than 1000 feet are not typically spanned by foraging Indiana bats. Therefore, even though suitable habitat exists in the project vicinity, it is unlikely the habitat will be utilized as it is part of a non-contiguous landscape. Additionally, the placement of the single turbine is also not adjacent to any known migratory areas, refuges, major flyways, or known nesting areas, and the turbine is of tubular monopole design. Based on the site information, the small scale of the project (a single turbine), and the uncertainty of migratory patterns, you have concluded that the proposed project may affect, but is not likely to adversely affect the Indiana bat, and that the likelihood for take is discountable. We concur with your determination.

We recommend that the DOE encourage "Renewable Energy Grant Funds" grant recipients to monitor wind turbines for impacts to birds and bats, and require notification to DOE and this office if operation of wind turbines results in mortality of these species. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated.

We understand that a Draft Environmental Assessment for the project will be prepared and provided for our review. Thank you for the opportunity to provide comments. If you have any additional questions or concerns, please contact Heidi Woeber of my staff at 309-757-5800, extension 209.

Sincerely,

JeMillar

for Richard C. Nelson
Field Supervisor

cc: USFWS/R3/ES (Gosse)
ILDNR (Shank)

s:\office users\heidi\concurnlaadoegrantsingleturbinelibmancompany.doc

Attachment C-6
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

November 8, 2010

Mr. Wes Slaymaker, P.E.
WES Engineering Inc.
706 S. Orchard Street
Madison, Wisconsin 53715

Re: Wind Turbine Project – Libman Company (REVISED)
City of Arcola, Douglas County, Illinois
U.S. Department of Energy Funds

Dear Mr. Slaymaker:

Thank you for notifying the Illinois Department of Agriculture (IDOA) of the site change for Libman's wind turbine project. The revised project has been examined for its potential impact to agricultural land in order to determine its compliance with the Illinois Farmland Preservation Act (505 ILCS 75/1 et seq.). Our analysis also relates to the federal Farmland Protection Policy Act (7 USC 4201 et seq.), which specifies that federal actions affecting farmland conversion shall be consistent with state and local programs to protect farmland.

The project still involves the construction of a single 415 ft tall, 1.5 MW wind turbine but at a location some 450 feet further north of the original site. The turbine is being relocated in order to meet the residential setback distance as well as to allow for Libman's future expansion without compromising the turbine's location.

Because this wind turbine site will be on Libman property that is within Arcola's corporate boundaries and appropriately zoned for the use, the IDOA has determined the new project site complies with the Illinois Farmland Preservation Act.

Sincerely,

Steven D. Chard

Steven D. Chard, Acting Chief
Bureau of Land and Water Resources

SDC:TS

cc: Mark Daniel, Attorney
Butch Fisher, Douglas County SWCD
Agency project file

From: Weselley Slaymaker <wes@WESengineering.com>
Subject: **FSA letter on prime farmland for Libman Wind project**
Date: November 8, 2010 9:00:41 AM CST
To: steve.chard@illinois.gov
Cc: "P.C. Mark Daniel Daniel Law Office" <mark@thedaniellawoffice.com>
2 Attachments, 2.6 MB

Steve

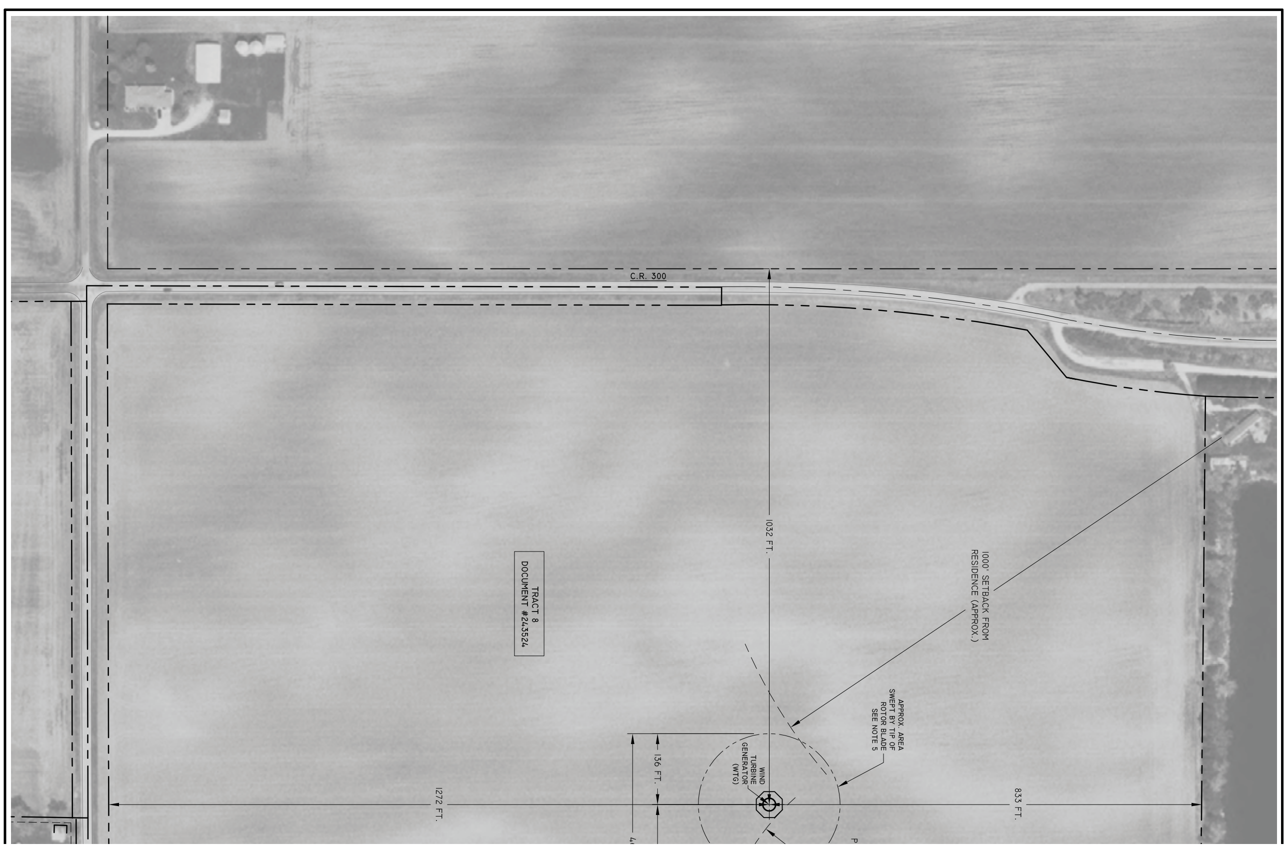
thanks for agreeing to quickly revise your letter for the Libman wind project, the location has moved North approx 450 feet, see attached revised site plan. This new location is also in a farm filed owned by Libman Equipment LLC. The access road is approximately 950 long, so the acreage disturbed varies little from the plan submitted to you in June where there was a longer access road from the South (but part was on an existing gravel road to access the fire water lagoon and about 850' was new road)

The underground wire trench is an additional 450' long and 2' wide

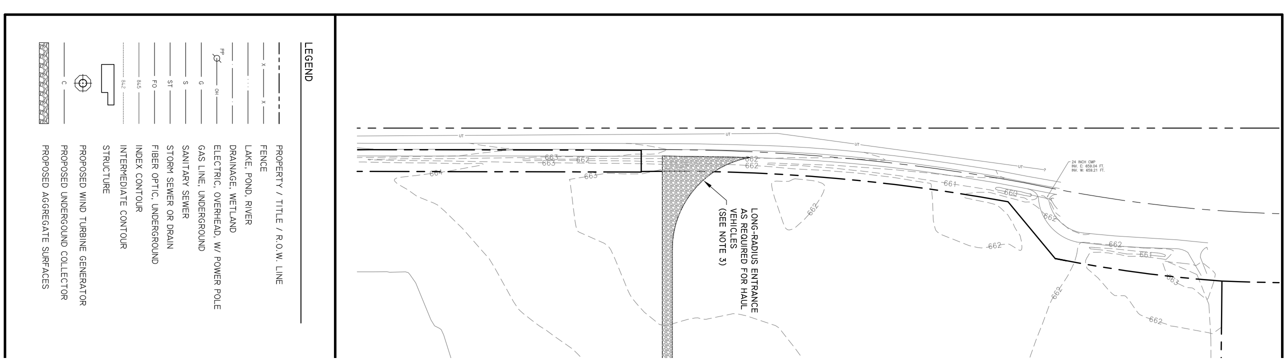
We have a permit meeting tomorrow night so if you were able to email or fax a revised letter by end of day that would be fantastic

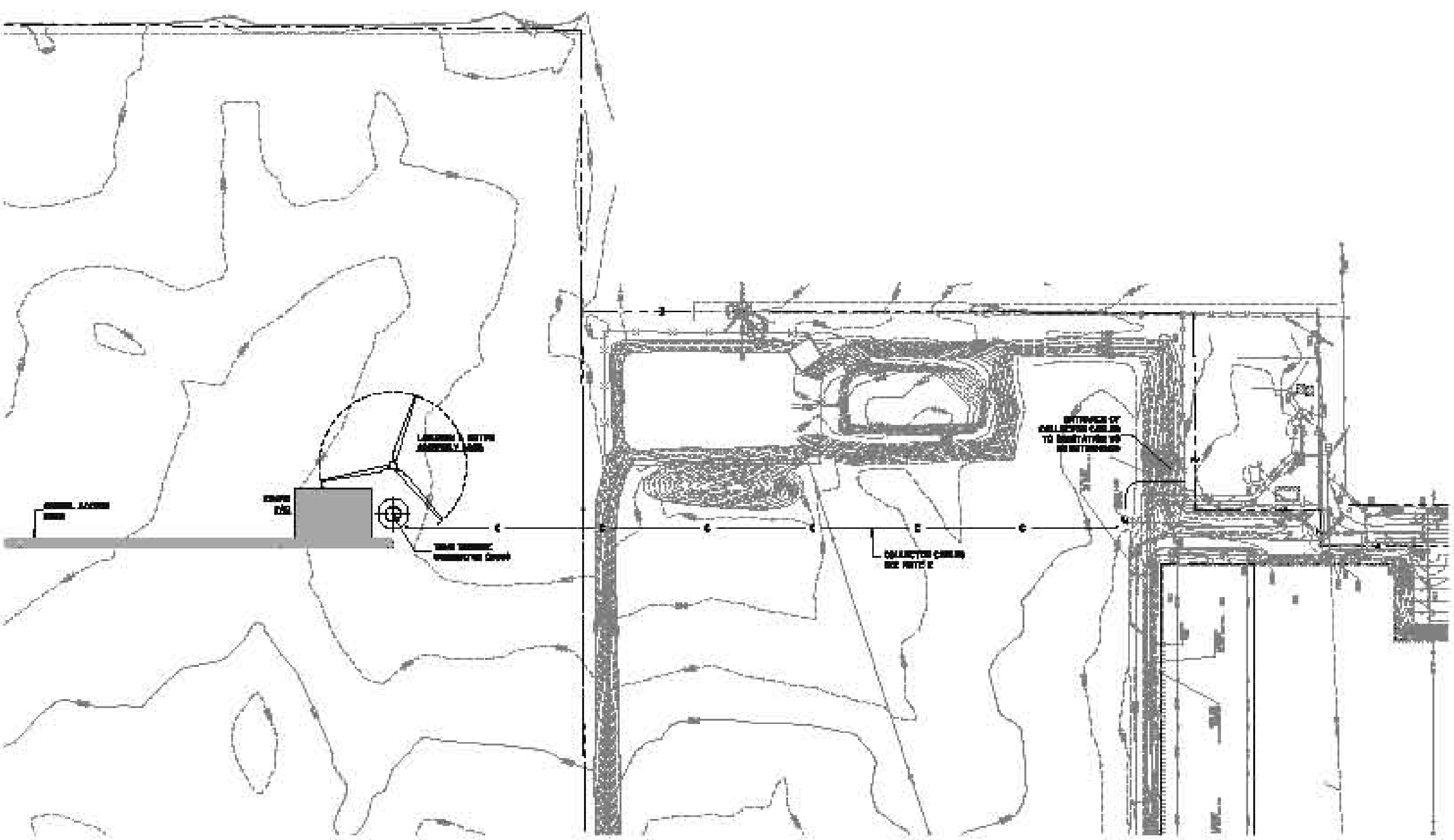
Thanks

Wes Slaymaker, P.E.
President
WES Engineering Inc.
706 S. Orchard St
Madison, WI 53715
608-259-9304 Orchard St Office
608-251-6733 Paterson St Office
608-299-0426 fax



wes@wesengineering.com





SOURCE OF BASE MAP

1. [illegible]
2. [illegible]
3. [illegible]

CONSTRUCTION COORDINATES

PT NO.	[illegible]		[illegible]	
	LATITUDE	LONGITUDE	NORTHING	EASTING
SITE	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

CONSTRUCTION NOTES & SPECIFICATIONS

1. [illegible]
2. [illegible]
3. [illegible]

NORTH

LIBMAN

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

SITE PLAN

SHEET 2

REVISION 0

NO.	DATE	REVISION	APP'D
0	[illegible]	[illegible]	[illegible]

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

July 15, 2010

Mr. Wes Slaymaker, P.E.
WES Engineering, Inc.
706 S. Orchard Street
Madison, Wisconsin 53715

Re: Wind Turbine Project - Libman Company
City of Arcola, Douglas County, Illinois
U.S. Department of Energy

Dear Mr. Slaymaker:

The Illinois Department of Agriculture (IDOA) has examined the above-referenced project for its potential impact to agricultural land in order to determine its compliance with the Illinois Farmland Preservation Act (505 ILCS 75/1 et seq.). Our analysis also relates to the federal Farmland Protection Policy Act (7 USC 4201 et seq.) which specifies that federal actions affecting farmland conversion shall be consistent with state and local programs to protect farmland.

The Libman Company, founded in 1896, is headquartered in Arcola. Formerly known as Libman Broom Company until 1989, the company manufactures household, hardware, and commercial cleaning tools. The Libman Company plans to construct a single 415 foot' tall, 1.5 MW wind turbine approximately 1,000 feet north of its existing plant site. Located entirely on Libman property, the generated electricity will use underground cables and connect to the existing transformer and switchgear, thus providing power to the Libman plant.

Currently, the proposed turbine site is in cropland use. Already zoned for industrial use, the ±2 acre agricultural site will be converted to the wind turbine site and its access road. Because the property is located within Arcola's corporate limits on company-owned property, the IDOA has determined the project complies with the Illinois Farmland Preservation Act.

Enclosed are two copies of the USDA Natural Resources Conservation Service Form AD-1006. One copy is to be included in the project's Environmental Assessment; the other is for your files.

Sincerely,

Steven D. Chard

Steven D. Chard, Acting Chief
Bureau of Land and Water Resources

SDC:JL

Enclosures – 2

cc: Butch Fisher, Douglas County SWCD
Agency project file

(25)

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 7/7/10
Name Of Project Libman Wind Project	Federal Agency Involved Department of Energy
Proposed Land Use Wind Turbine site	County And State Douglas Co. IL
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 7/7/10

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 N/A	Average Farm Size 372
Major Crop(s) Corn, Soybeans, Wheat, Hay	Farmable Land In Govt. Jurisdiction Acres: 29,633,500	% 97	Amount Of Farmland As Defined in FPPA Acres: 27,695,900	% 91
Name Of Land Evaluation System Used Illinois	Name Of Local Site Assessment System Statewide		Date Land Evaluation Returned By NRCS 7/12/10	

	Maximum Points	Site A	Site B	Site C	Site D
PART III *(To be completed by Federal Agency)*			Alternative Site Rating		
A. Total Acres To Be Converted Directly		0.5			
B. Total Acres To Be Converted Indirectly		0.7			
C. Total Acres In Site		1.2			
PART IV *(To be completed by NRCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		1.2			
B. Total Acres Statewide And Local Important Farmland		–			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		.000004			
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			
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points	See Attached Illinois LESA Site Assessment & factors			
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	200 ~~160~~				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	99			
Total Site Assessment *(From Part VI above or a local site assessment)*	200 ~~160~~	76			
TOTAL POINTS *(Total of above 2 lines)*	300 ~~260~~	175			

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ■

Reason For Selection:

* When using the State of Illinois 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) Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Libman Wind Project
City of Arcola, Douglas County, Illinois
Department of Energy Funds

PART VI-A Illinois Site Assessment Criteria		Maximum Points	Site A
1.	Land Use on the Site	20	20
2.	Adjacent Land Use	20	16
3.	General Character of Area within 1.5 Miles of Site	20	10
4.	Distance to City	20	0
5.	Zoned Use of Proposed Site	20	0
6.	Zoned Use of Land Adjacent to Proposed Site	20	12
7.	Planned Land Use of Proposed Site	20	0
8.	Compatibility of Proposed Use with Surrounding Land Uses	20	0
9.	Alternative Sites Proposed on Less Productive Land	10	10
10.	Availability of Central Water System	10	1
11.	Availability of Central Waste Disposal System (Sewer)	10	1
12.	Transportation	10	6
TOTAL SITE ASSESSMENT POINTS		**200**	**76**
PART VII			
	Relative Value of Farmland	100	99
	Total Site Assessment	200	76
	TOTAL ILLINOIS LESA POINTS	**300**	**175**

07152010
JL

June 23, 2010

Farm Service Agency
Natural Resources Conservation Service
TUSCOLA SERVICE CENTER
900 S WASHINGTON ST
TUSCOLA, IL 61953-7506

RE: Libman Wind Project, Arcola, IL

Dear Sir/Madam:

I am writing to request a review of the proposed Libman wind turbine project in Douglas County, IL for its possible impact to prime farmland. The Libman Wind Project is a 1.5MW wind project consisting of one large wind turbine installed on property owned by Libman corporation on the North edge of Arcola. I am acting on behalf of the Libman project to prepare the maps and turbine information and assist with your review.

Libman proposes to install a single large turbine that is 415' tall on a concrete pad foundation. The electricity would be carried underground on the property and connect to the existing transformer and switchgear supplying the Libman plant with electricity. The current site is owned by Libman and leased to a farmer for growing of corn or soybeans.

Please advise if there is any impact to prime farmland. This project has received federal grant monies and is undergoing an Environmental Assessment, and needs your feedback. Thanks

Sincerely,

Wes Slaymaker, P.E.
President
wes@WESengineering.com
WES Engineering Inc
706 S. Orchard St
Madison, WI 53715
608-259-9304

turbine GPS coords

39 deg 41’ 30.2”
88 deg 17’ 46.1”

Photo 1- Libman building in the foreground, looking North

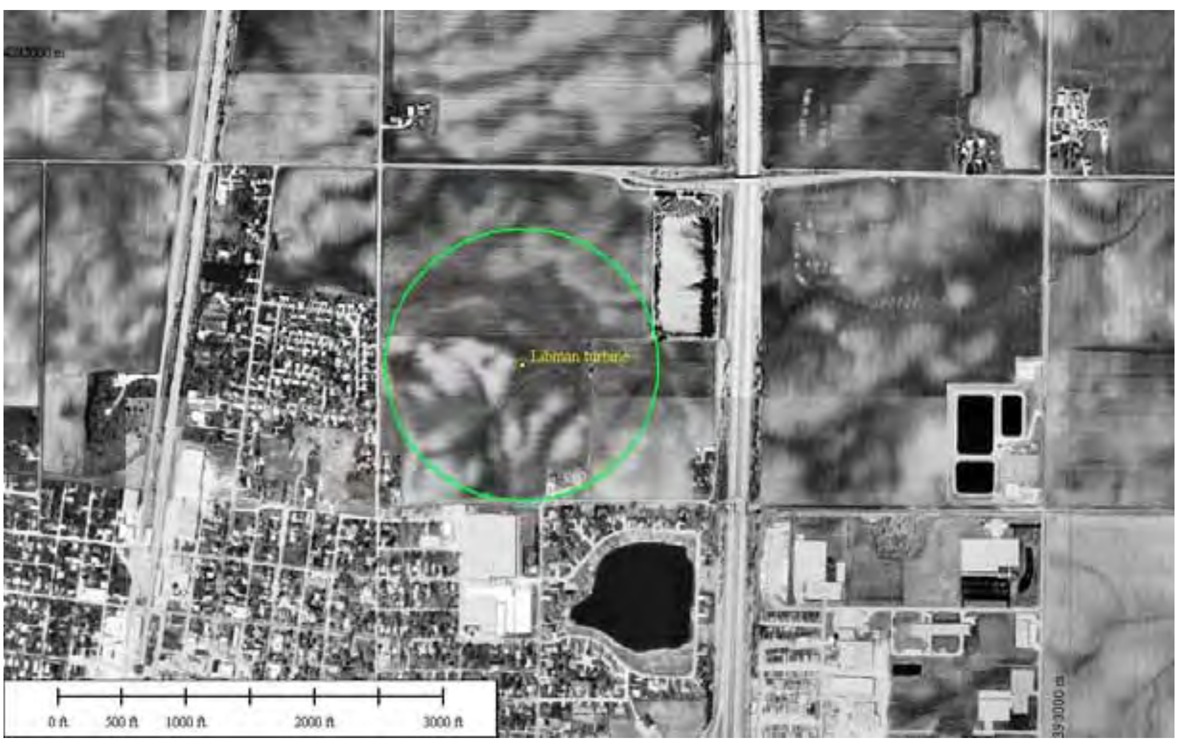
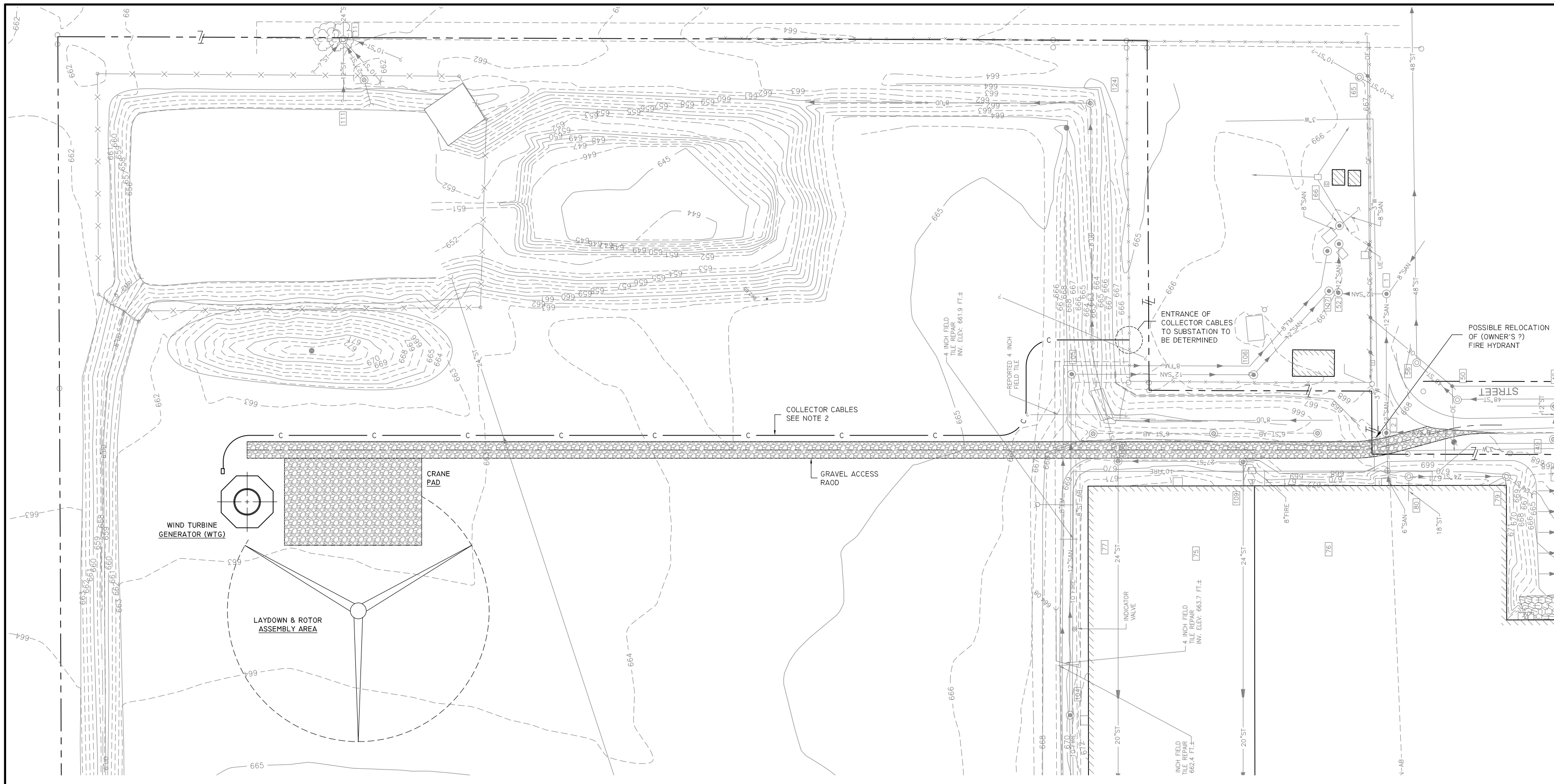


Figure 1- Libman approx. turbine location and 1000’ radius buffer (green circle)



LEGEND

- PROPERTY LINE
- FENCE
- LAKE, POND, RIVER
- DRAINAGE, WETLAND
- ELECTRIC, OVERHEAD, W/ POWER POLE
- GAS LINE, UNDERGROUND
- SANITARY SEWER
- STORM SEWER OR DRAIN
- FIBER OPTIC, UNDERGROUND
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- STRUCTURE
- PROPOSED WIND TURBINE GENERATOR
- PROPOSED UNDERGOUND COLLECTOR
- PROPOSED AGGREGATE SURFACES

SOURCE OF BASE MAP

1. TOPOGRAPHIC DATA, SITE FEATURES AND PROPERTY LINES CONTAINED IN "TOPOBASE-072007.DWG", ORIGINALLY PREPARED BY BERNS, CLANCY AND ASSOCIATES, P.C., URBANA, ILLINOIS, AND PROVIDED ON 4.20.2010.
2. COORDINATE SYSTEM IS ILLINOIS STATE PLANE, EAST ZONE, NAD 83(86). VERTICAL DATUM IS NAVD 88.
3. CURRENT CONDITIONS MAY VARY FROM THOSE SHOWN ON THE BASE MAP. CONTRACTORS PERFORMING WORK AT THE SITE SHALL CONFIRM CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY OWNER OF DISCREPANCIES.

NORTH

0 25 50 100

1 INCH = 50 FEET ON 22" X 34" ORIGINAL

CONSTRUCTION COORDINATES

PT NO.	SPC, ILL EAST, NAD 83(86)		GEOGRAPHIC, NAD 83(86)	
	NORTHING	EASTING	LATITUDE	LONGITUDE
WTG	1,101,444.0	994,259.0	39° 41' 28.50"	88° 17' 51.96"

COORDINATE CONVERSION MADE USING U.S. ARMY CORPS OF ENGINEERS SOFTWARE - CORPSCON, V. 6.0.1.

CONSTRUCTION NOTES & SPECIFICATIONS

1. GEOMETRY OF PROPOSED ACCESS ROADS, CRANE PADS AND ASSEMBLY AREAS IS BASED ON TYPICAL CRITERIA PUBLISHED BY VENSYS FOR THEIR 70 / 77 M ROTOR WTG. DOCUMENT # KRANSTELLFLACHE_31.10.2007.DOC AND ZUWEGUNG_ACCESS_ROADS.DOC, REV. A.
2. ALIGNMENT OF COLLECTOR CABLES MAY BE ADJUSTED AFTER CONFIRMING THE LOCATION OF A WATERLINE IN THIS VICINITY (CONSTRUCTED AFTER THE BASE MAP WAS SURVEYED.)
3. XXX

*** DRAFT IN PROGRESS ***
4.29.10 - 1:00 P.M.

LIBMAN

NO.	DATE	REVISION	APP'D
0	4.30.10	XXX	FMS

SITE PLAN

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

DRAWN:	FMS
APPROVED:	FMS
DATE:	APRIL 2010
PROJ. NO.:	--
FILE:	\SITE PLAN 2010 0429.DWG
SCALE:	AS SHOWN

FREDERICK M. SWED, JR., P.E.
CONSULTING ENGINEER
MADISON, WISCONSIN
608.218.9615

SHEET 1
REVISION 0

APPENDIX D: ANALYSIS & SUPPORTING DOCUMENTATION

Attachment D-1
Libman DOE EA Determination

PMC-EF2a

(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: Illinois Department of Commerce & Economic Opportunity **STATE:** IL

PROJECT TITLE : Libman Company Wind Turbine Project

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0000052	EE0000119	GFO-10-313-001	0

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:

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 Illinois Department of Commerce & Economic Opportunity would use DOE funding to purchase and install a 2.5 MW wind turbine on a 40-acre plot of land adjacent to the Libman Company's Arcola, Illinois factory.

Existing and potential impacts are unknown at this time. Per the DOE NEPA implementing regulations (Appendix C to Subpart D to 10 CFR Part 1021 - C12, as noted above), preparation of an Environmental Assessment is required prior to allowing federal funds for this proposed project.

NEPA PROVISION

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:
DOE funds are not authorized for project site preparation and all installation activities pending outcome of the environmental assessment.
This restriction does not preclude you from:
Illinois Department of Commerce & Economic Opportunity is authorized to initiate the preparation of an EA by a third-party contractor, consistent with DOE NEPA implementing regulations. DOE, Illinois Department of Commerce & Economic Opportunity, and the third-party contractor shall enter into a

Memorandum of Agreement (MOA) defining the scope of services to be completed by the third-party contractor on behalf of DOE.
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.

Note to Specialist :

None Given.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Robin Sweeney
NEPA Compliance Officer

Date:

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:
Field Office Manager

Date: 4/15/2010

Attachment D-2

Libman DCEO ARRA Community Renewable Energy Program Application

APPENDIX A
ARRA Community Renewable Energy Program
Application Cover Page

Applicant Information:

Libman Company	37-0994957	005463997
Applicant name	FEIN	DUNS number*
220 N Sheldon St		Douglas
Applicant address (include 9 digit zip code)		County
Project address (if different from above)		County
217-268-4200		217-268-4168
Telephone number		Fax Number
Aaron Libman		President
Applicant project manager		Title
Aaron@Libman.com		Libman.com
E-mail address		Websit address
Ameren Energy		Ameren Cilco
Electric Utility (Delivery Service Provider)		Natural Gas Utility

Proposed Start Date: December 2009 **Planned Completion Date** July 2011

Project Summary:
The proposed project consists of a large 100m tower, 2.5 MW wind turbine to be placed in a 40 acre plot of land bordering The Libman Company's Arcola, IL factory. The land is owned by Libman, and has been determined to have sufficient buffer space. The project would generate about 6,500,000 kwhrs per year, used to offset nearly half the electricity used by the factory. The $6,490,600 project is economically beneficial with $500,000 from the DCEO state grant funds and 30% federal project funds (fed. grant 1603 or tax credit). A recent pre-feasibility report assumed only 25% incentive-funds, and noted simple payback in 10 years and a 20 year return of over 9%.

The Libman Company is a leading manufacturer of cleaning products in the U.S. and abroad, and is based here in Illinois. Due to increased distributor demands for products from manufacturers with 'low carbon footprints', The Libman Wind Project acts to create jobs and economic development in Illinois.

Project Type:

☐ Solar Thermal Hot Water ☐ Solar Photovoltaic
☐ Solar Thermal Space Heating ☐ Other Specify:
☒ Wind Energy

Organization Legal Status:

☐ Individual ☐ Not For Profit Corp. ☐ Nonresident Alien
☐ Sole Proprietor ☐ Tax Exempt ☐ Medical Corporation
☐ Partnership/Legal Corp. ☐ Governmental ☐ Pharmacy-Noncorporate
☒ Corporation ☐ Estate or Trust ☐ Pharmacy/Funeral Home/ Cemetery/ Corporation

Public Entity Type:

☐ Local Government ☐ Community College ☐ State Agency
☐ K-12 School ☐ Public University ☐ Federal Agency

Is your business a Female- or Minority-owned business?

☐ Female-owned ☐ Minority-owned

*To obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, see http://www.dnb.com/US/duns_update/. A DUNS number is optional at time of application. However, the applicant must have a DUNS number in order to register with the Central Contractor Registration (CCR). All applicants selected for award under this RFA will be required to register with the CCR prior to grant award. To register with the CCR,see http://www.ccr.gov. Applicants who are not currently registered with CCR should note that the registration process can take at least 10 days to complete.

APPENDIX A: (cont.)

Financial Information:

	Dollar Amount	Percent
Total grant request	**$500,000**	**7.7**
Applicant & partner investment (minimum 25%)	**$4,043,420**	**62.3**
Sum of other public funds (received or applied for)*	**$1,947,180**	**30**
Total project cost	**$6,490,600**	**100%**

* Such as State Energy Program, Energy Efficiency and Conservation Block Grant, Illinois Clean Energy Community Foundation, and Federal Business Energy Investment Tax Credits.

Job Creation/Retention (in FTE):

Categories	Jobs Created	Jobs Retained
< 1 year	27	1
1-2 years	0	1
2-5 years	0	1
> 5 years		
TOTAL JOBS	27	3

*Note: Jobs should be expressed as "full time equivalents" (FTEs), calculated as total hours worked divided by the number of hours in a full-time schedule as defined by the applicant. The FTE jobs should be placed in the categories above to reflect whether they are temporary or long-term jobs. A job "created" is a new position created and filled, or an existing position that is filled as a result of the Recovery Act. A job "retained" is an existing position that would not have been continued in the absence of ARRA funding.

Energy Produced or Saved and Greenhouse Gas Emission Reductions:

Fuel	Energy Saved	Million Btu	CO_2
Electricity (kWh)	6,504,300	67,254	4,696
Natural Gas (therms)			
Liquid Petroleum (LP) (gallons)			
Coal (tons)			
Oil #2 (gallons)			
Oil #6 (gallons)			
TOTAL	6,504,300	67,254	4,696

1 kWh = 0.003412/0.33 = 0.01034 MMBtu

1 therm = 0.1 MMBtu

1 gallon LP = 0.0955 MMBtu

1 ton coal = 20.169 MMBtu (U.S. avg., use actual)

1 gal #2 oil = 0.138874 MMBtu

1 gal #6 oil = 0.149793 MMBtu

1 kWh = 0.000722 Metric Tons CO2

1 therm = 0.00529 Metric Tons CO_2

1 gallon LP = 0.005807 Metric Tons CO_2

1 ton coal = 1.747 Metric Tons CO_2

1 gal #2 oil = 0.01015 Metric Tons CO_2

1 gal #6 oil = 0.01181 Metric Tons CO_2

Renewable Energy Capacity:

kW Capacity: 2500 or therms Capacity: _____

Required NEPA Environmental Checklist:

Applicant has completed and attached the required NEPA Environmental Checklist ☒

Note: Applicants should visit the DOE website https://www.eere-pmc.energy.gov/NEPA.asp, register as a new user, and fill out the EF-1 form as directed. Please select Doug Seiter as the DOE Project Officer. DO NOT SUBMIT TO DOE. Print a copy of the completed form and attach with the application to DCEO. The Department will not accept applications without the EF-1 form attached.

APPENDIX A: (cont.)

Applicant hereby certifies that:

- All authorizations required to perform the project, described in its application, have either been obtained or will be obtained no later than 90 days following the grant beginning date set forth in the Notice of Grant Award issued by the Department.
- It understands that it will have to enter into and comply with the terms of a grant agreement.
- The project complies with all applicable state, federal, and local laws, ordinances, and regulations and that all required licenses, permits, etc., have either been obtained or will be obtained no later than 90 days following an award by DCEO.
- It is not in violation of the prohibitions against bribery of any officer or employee of the State of Illinois as set forth in 30 ILCS 505/10.1.
- It has not been barred from contracting with a unit of state or local government as a result of a violation of Section 33E-3 or 33E-4 of the Criminal Code of 1961 (720 ILCS 5/33 E-3 and 5/33 E-4).
- It is not in violation of the Educational Loan Default Act (5 ILCS 385/3).
- It understands that the State Finance Act, 30 ILCS 105/30 may apply and that payments under this grant Program are contingent upon the existence of a valid appropriation, and that no officer, institution, department, board or commission shall contract any indebtedness on behalf of the State, or assume to bind the State in an amount in excess of the money appropriated, unless expressly authorized by law.
- It understands that the Illinois Prevailing Wage Act (820 ILCS 130/0.01) may apply and that grantees are responsible for determining if their projects will trigger compliance.
- It will comply with all applicable terms and conditions of the American Recovery and Reinvestment Act.
- As of the submittal date, the information provided in its application is accurate, and the individual signing below is authorized to submit this application and to sign all financial documents related to an agreement.

	(217)377-8785
Authorized Official (signature*)	Telephone
Aaron Libman	(217)268-4168
Typed/Printed Name	Fax
Director of Operations	10/26/09
Title	Date
370994957	Libman Company
FEIN Number (9 digits, Federal Employment Id Number, does not start with "E")	Applicant

220 N Sheldon St

Authorized Signature Address

Arcola, 619101616

Authorized Signature City, 9-digit Zip (find 9-digit zip at http://zip4.usps.com/zip4/welcome.jsp)

Aaron@Libman.com

Authorized Signature E-mail Address

*Electronic signatures not acceptable. Please supply Certifications (this page) with original signature via mail, fax or electronically (scanned document)

APPENDIX B
ARRA Community Renewable Energy Program
Documentation Outline

All applicants shall include the following information and documentation:

1. Profile of the applicant organization and key partners. (2 page narrative maximum). Provide information on the applicant organization, including the type of organization, organizational mission, primary products or services, age and history of organization, size of organization (number of employees and level of annual sales), legal organization, management team members, and, if applicable, a list of the board of directors. A business plan document must be submitted if the applicant organization has less than three years of successful operating experience. In addition, identify primary partner organizations that were selected and have agreed to participate in the proposed project. Identify the primary role of each partner, with regard to assigned project tasks and activities.

2. Expertise/qualifications of applicant organization and key partners. (2 page maximum). Provide background information on the experience of both the applicant and key partners. Specifically identify the relevant experience of the management team with regard to the proposed project. Identify other additional professional resources and support available to the applicant.

3. Project description. (4 page maximum) Describe the project, including goals and objectives, a detailed statement of work (required tasks and activities), and timelines for start and completion of key tasks. The description should also include information on the proposed project location, licenses and permits required, and the current status of the project. Describe in detail the proposed renewable energy system including the system size, components and materials, estimated annual production, and any applicable calculations. Also include the name, address, license number, and proof of insurance of the system installer or contractor. For wind energy projects, a detailed description of the project site and demonstration that the location is suitable for wind generation, and results of any wind site assessment analysis conducted.

4. Project benefits. (2 page maximum) Discuss the merits of the project per the evaluation criteria provided in the application guidelines. The applicant should identify expected project outcomes (i.e. job creation, energy savings or generation, GHG emission reductions, etc.). Please explain how the benefits were estimated for purposes of the application and how they will be measured for reporting after project completion.

5. Project budget. (1 page maximum) Discuss the project budget with an explanation of all project activities and related costs that are eligible for grant reimbursement.

The total proposal, including attachments, should not exceed 25 pages in length and should be printed duplex (two-sided).

APPENDIX C
ARRA Community Renewable Energy Program
Proposed Project Costs

Summary:

	Total Costs	Applicant Investment	Contributions From Other Public Sources	State Funding Requested
A. Purchase of Services:	**1,115,833**	**695,125**	**334,750**	**85,958**
B. Equipment/Materials:	**5,374,767**	**3,348,295**	**1,612,430**	**414,042**
Total:	**6,490,600**	**4,043,420**	**1,947,180**	**500,000**
Percent of Total:	**100%**	**62.3**	**30**	**7.7**

Purchase of Services: For the installation of renewable energy generation equipment list all applicable costs for design, construction, repair, or maintenance, and fees for legal, financial, or artistic services. All subcontracts must be explained in detail, include the license number and address of the subcontractor, and be attached to the end of this section.

	Total Costs	State Funding Requested
1. Balance of Plant Contractor	**$985,833**	**$75,943**
2. Engineering	**$55,000**	**$4,237**
3. Project Management and Legal	**$75,000**	**$5,778**
4.		
5.		
6.		
Subtotal	**$1,115,833**	**$85,958**

Equipment/Materials: List all items of equipment to be purchased valued greater than $100.

	Total Costs	State Funding Requested
1. Turbine, Tower and Blades	**$5,170,600**	**$398,314**
2. Rock for Roads	**$21,667**	**1,669**
3. Electrical Wire	**$95,000**	**7,318**
4. Concrete/Rebar	**$87,500**	**6,741**
5.		
6.		
Subtotal	**$5,374,767**	**$414,042**

APPENDIX C: (cont.)

Financial Partners and All Other Sources of Investment including other Public Funds: Specify in reasonable detail including phone number, contact person and address.

	Total Investment
1. The Libman Company: Aaron Libman, Aaron@libman.com, (217)377-8785	**$4,043,420.00**
2. 30% federal funds (tax credit or grant 1603)	**$1,947,180.00**
3.	
Subtotal	**$5,990,600.00**
Project Total	**$6,490,600.00**
State Funds Requested	**$500,000.00**

Attach additional budget pages if necessary.

Financial Partnerships and Other Investment Sources, Letter or Guidelines:

Provide letters from each financial partner or funding entity indicating the amount of their support and the project commencement date expected for their partnership.

In the event of funding by private foundations or public sources, if such a letter is not yet available, indicate the anticipated source (USDA program name, etc.) and supporting documentation or guidelines for the anticipated source.

Applicant Investment:

Please describe the sources of the minimum 25% applicant investment, in addition to funds from any financial partners described above. Specifically identify whether funds are cash, in-kind, or other collateral.

VENSYS ENERGY AG

The Perfection of Gearless Wind Turbines

Modern wind turbines have to support reliable technology with the highest degree of efficiency. This challenge is what drives the development of VENSYS wind turbines.

VENSYS products are the result of intensive research and development activities which have been ongoing since 1990. The design principle: simplicity and reduction of mechanical components. The evolution and perfection of proven technologies combined with an innovative drive train concept are the key to success.

VENSYS wind turbines are consequently distinguished by a few restricted, high-quality components, reduced wear parts and by the exclusive use of long-life components.

The direct rotor-driven VENSYS multipole generator with permanent-magnet excitation, the patented air cooling system* and the blade pitch system with its low-wear toothed belt drive are the best prerequisites for undisturbed operation.

The triple combination of compact design, efficient energy conversion and intelligent control system maximises the energy yield and minimises downtimes, even with regional changes in local environments and grid conditions.

The proprietary development of all essential components of the VENSYS wind turbines ensures the availability of competent and experienced contact partners at all times. This gives reliability for projects, from planning to start-up, and moreover for a long service life.

* DE 19636591C

Attachment 1 - Project Maps and Images

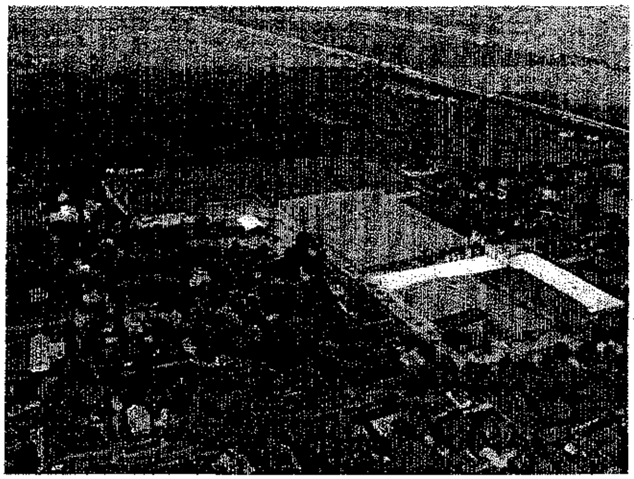


Figure 1.1: Libman building in the foreground, looking north

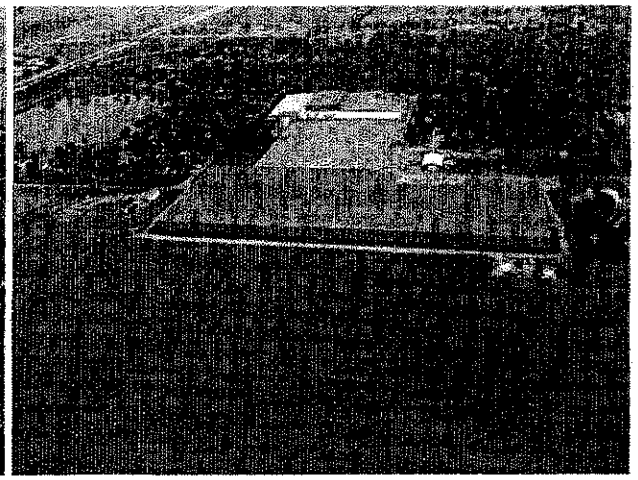


Figure 1.1: Libman building, looking south

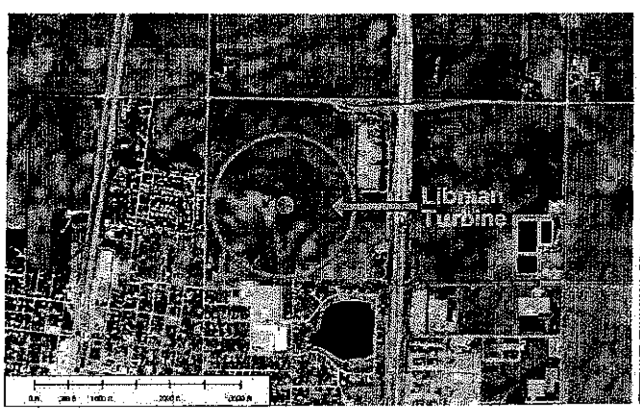


Figure 1.3: Libman turbine location and 1000' radius buffer

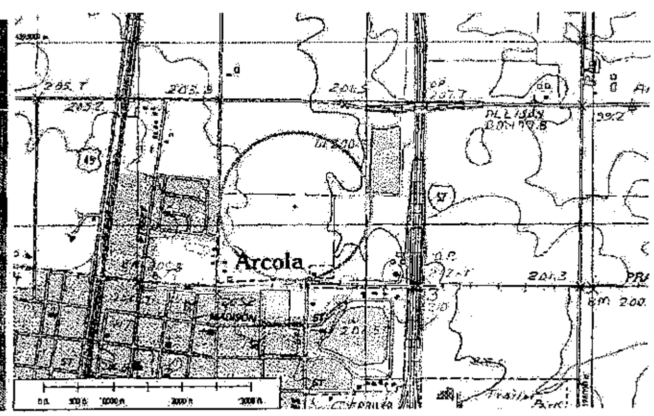


Figure 1.4: Libman turbine location on topo map

Attachment 2 - Wind and Energy Estimates

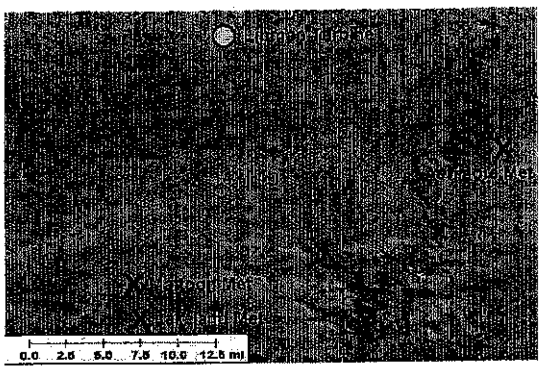


Figure 2.1: Digital elevation map showing location of nearby MET towers in relation to Libman

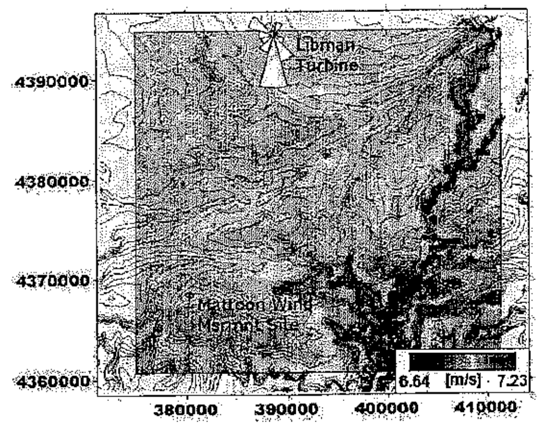


Figure 2.1: Modeled wind speeds in area and turbine with wind rose

Fuhrländer FL2500 on 100m Tower

Month	Valid Data Points	Hub Height Wind Speed (m/s)	Time At Zero Output (%)	Time At Rated Output (%)	Mean Net Power Output (kW)	Mean Net Energy Output (kWh/yr)	Dollars Savings	Net Capacity Factor (%)
Jan	744	19.85	4.44	22.18	1,142.10	849,756	$60,435	45.7
Feb	696	16.84	6.61	12.79	855.1	574,659	$40,870	34.2
Mar	716	17.46	6.7	13.83	891.3	663,097	$47,159	35.7
Apr	731	18.45	6.02	15.46	1,059.90	763,152	$54,275	42.4
May	744	14.86	10.75	2.28	693.3	515,801	$36,684	27.7
Jun	387	13.63	13.44	6.46	536.8	386,485	$27,487	21.5
Jul	744	11.59	19.89	0.13	344.9	256,572	$18,247	13.8
Aug	744	10.28	20.03	0	222	165,163	$11,746	8.9
Sep	720	12.74	18.75	1.81	500.4	360,290	$25,624	20
Oct	744	17.13	5.65	11.29	887.6	660,376	$46,966	35.5
Nov	720	17.14	8.47	13.61	907.1	653,137	$46,451	36.3
Dec	664	16.02	11.3	11.3	757.1	563,306	$40,062	30.3
Overall	**8,354**	**15.56**	**10.93**	**9.32**	**739.7**	**6,480,033**	**$460,860**	**29.6**

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

Aeronautical Study No.
2009-WTE-11444-OE

Issued Date: 11/05/2009

Wes Slaymaker
W.E.S. Engineering LLC
706 S. Orchard St.
Madison, WI 53715

**** 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 Libman
Location:	Arcola, IL
Latitude:	39-41-30.20N NAD 83
Longitude:	88-17-46.10W
Heights:	492 feet above ground level (AGL) 1148 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 11/05/2011 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 POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

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 2009-WTE-11444-OE.

Signature Control No: 662719-119974152 (DNE -WT)

Michael Blaich
Specialist

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: Libman Company ARRA Comm REP
Project Number(s): 1005988 [0715257]
County: Douglas

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.

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

Attachment D-3a
Libman Wind Pre-Feasibility Report (June 2009)

Libman Wind Pre-feasibility Report

June 30, 2009

Prepared by:

Wes Slaymaker, P.E.
WES Engineering LLC
706 S. Orchard St
Madison, WI 53715
608-259-9304
wes@WESengineering.com

By:_________________________

Introduction

This report re-visits the energy production for two commonly available turbine types and the financial feasibility for a possible wind project at the Libman site in Arcola, Illinois, Douglas County.

The financial feasibility of the project is based on assumptions including obtaining federal grants, and assumed 2% per year inflation in electric costs. Precise costs for a project at this site will require a more extensive feasibility study or a design/build estimate.

Summary

Current economics of a wind project, electric rates and Libman electric usage make an on-site wind generator at Libman a possible option. Libman uses more than 14 million kwhrs per year. This amount is considerable more than the estimated amount produced by the largest turbine proposed, and more importantly, the wind turbine would rarely produce more energy than the company is consuming at any given time allowing the project to offset fairly high cost electricity and minimize selling excess generated power to Ameren at their avoided cost rate. It is assumed here Libman will continue with the Ameren bill structure where the average energy price is 7.112 cents per kwhr, and it is assumed a 2% yearly inflation although it may change larger amounts at longer intervals. The project will need the new grant offered from the Federal government (Stimulus Bill) for up to 30% of total project cost. Without this grant the project economics are not good. The federal government also offers a 30% Investment Tax Credit in lieu of the grant, and that may be evaluated if the grant application is unsuccessful. Conservative production numbers were used to assure that cash flow was always positive in every year and that the investor returns were reasonable even with low wind years and perhaps higher than average maintenance downtime. The payback on the investment is 10-13 years depending on the turbine choice. The long term IRR is 8-9% over twenty years. The financial spreadsheets in Appendix B show all assumptions, including borrowing at 7% interest rate for 12 year term the maximum amount that a bank will loan and still have good debt coverage every year.

Grants

The largest source of grant monies available today are through the Department of Energy for up to 30% of total project cost. There is also a USDA program, which offers grants up to $500,000,. it is a competitive program and there are no guarantees of success. It is assumed that the USDA grant could not be added to the DOE grant but the rules are not yet published for the DOE grant so that assumption is not certain. In the financial analysis it was assumed the project received a 25% grant.

There has been in the past a low interest loan program available for renewable energy generators through the Illinois Finance Authority, for up to $2 million dollars at 2% interest. Consultant had a wind project in Jo Daviess County Il that has qualified for this loan. It is a subordinate loan that requires the full amount be secured by company assets.

Project Site

Photo 1- Libman building in the foreground, looking North

Photo 2- Libman building looking South

The 40 acre site North of the manufacturing plant looks to be sufficient to site one large wind turbine. A location is shown in Figures 5 and 6. The turbine will need proper setbacks from nearby residences, in this case 1.1X the total height should be a sufficient setback distance from property boundaries as noise will not be an issue with the nearby Interstate. The location of the turbine in the middle of the field also places it in an area with the least obstruction to the free flow of the wind. A 1000 foot radius buffer is shown around the turbine, to show that no residences are within the 1000 foot radius.

Wind Data

The summary of wind data from the nearby Mattoon wind measurement site in Coles County, is shown in the following graph. This site is in similar area, but 45 feet higher (700') above sea level; it does sit at a higher elevation but the below software output in Figure 4 from the WASP wind modeling does not show the wind speeds vary significantly from the Libman Company site near Arcola Illinois to that at the tower location near Mattoon.

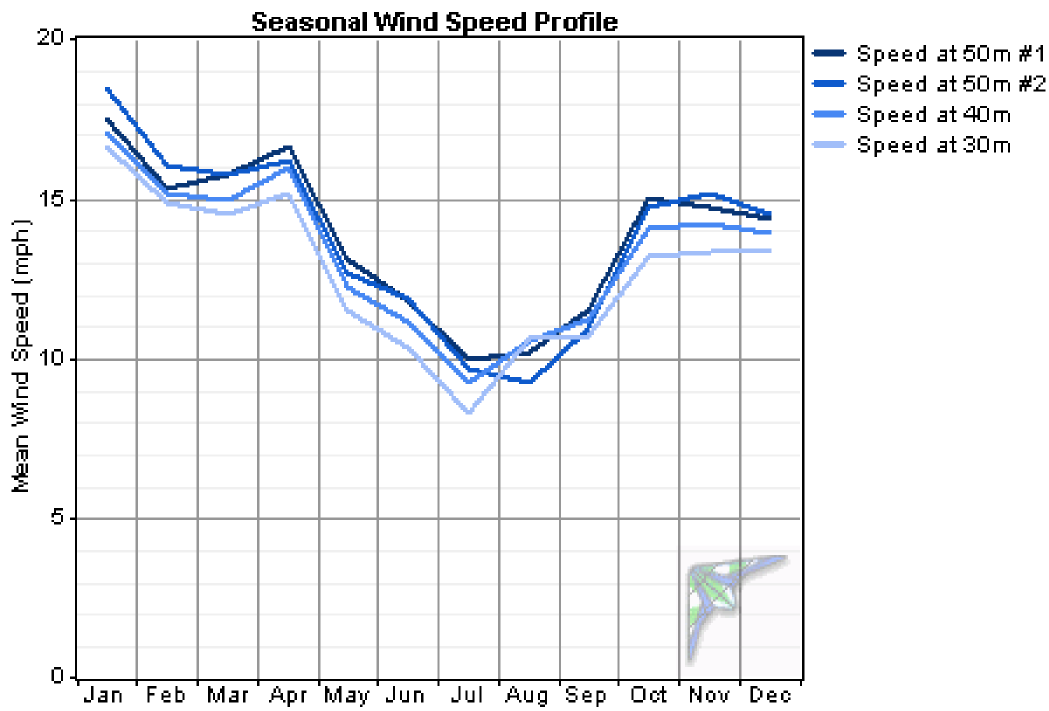


Figure 1- Monthly wind speed averages

The above graph also shows the measured shear between the 3 different instrument heights, which is not large due to the open and fairly flat nature of the wind measurement location.

The Mattoon met tower was sited approximately 17.5 miles South of the Libman site, at a similar elevation in an area without much change in terrain. The assumed wind speed at the Arcola, Libman site is 6.7 m/s (14.9 mph) at 80m above ground and 7.0 m/s at 100m above ground.

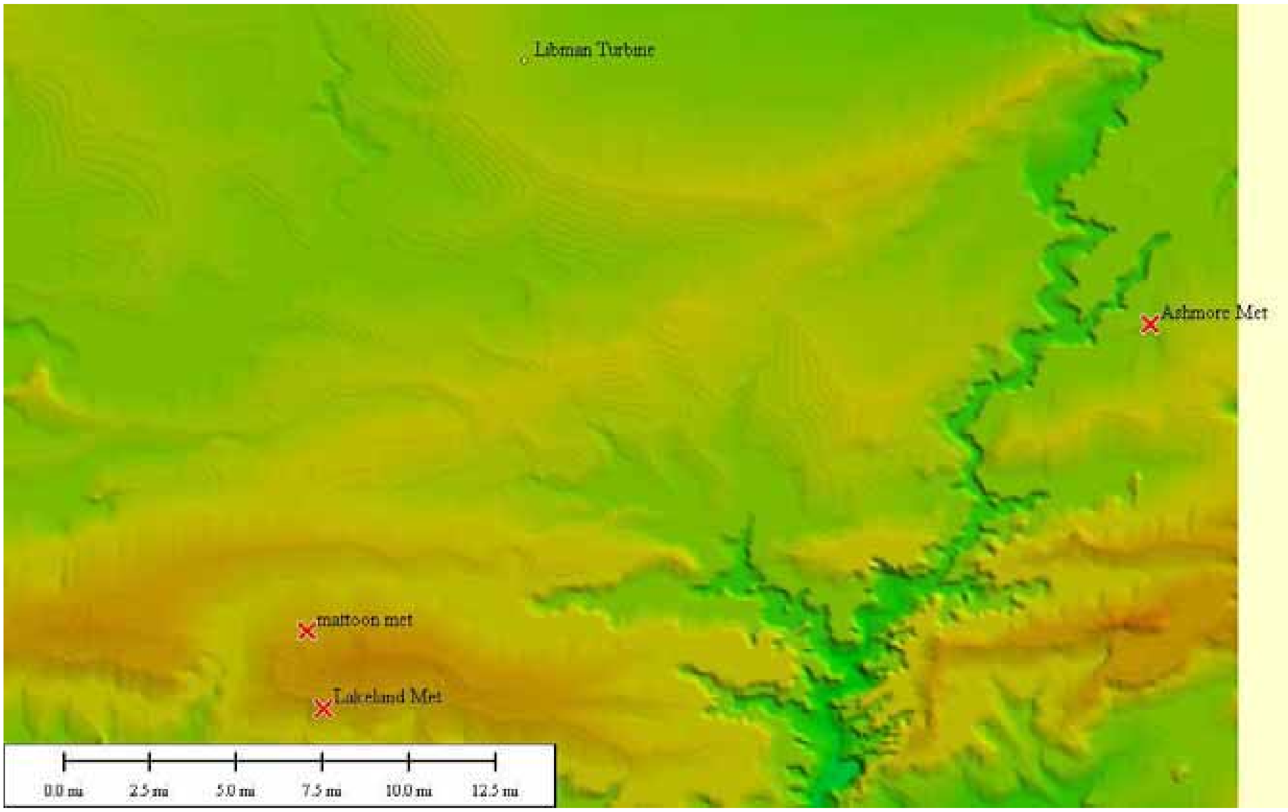


Figure 2- Digital Elevation Map showing location of nearby met towers in relation to Libman

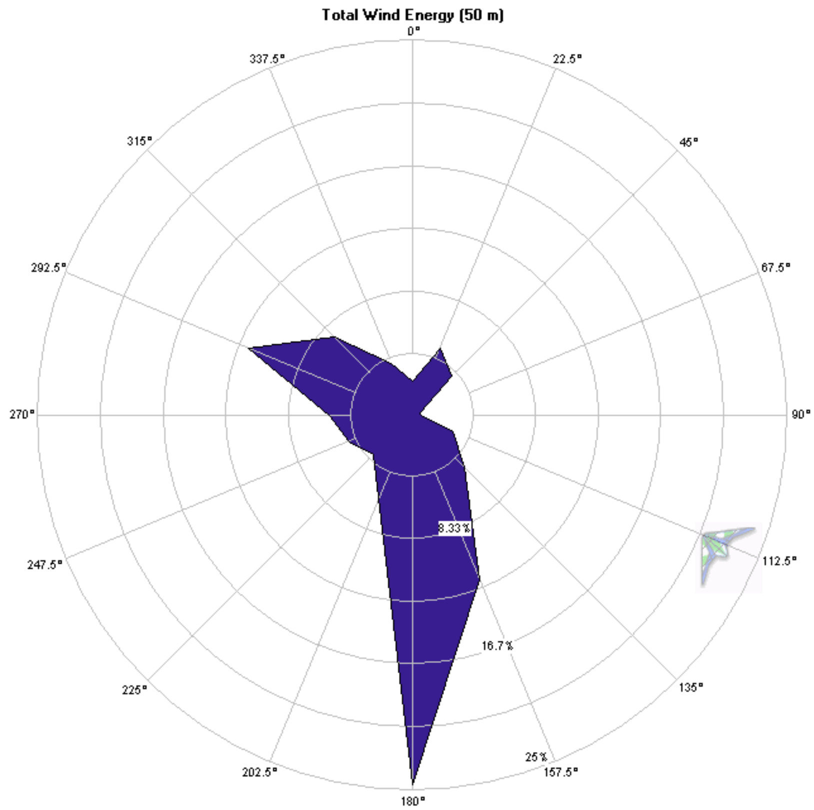


Figure 3- Wind Rose for Mattoon met tower, as percentage of total energy

The above wind rose shows the wind directions total energy, for a year. If this wind rose for Mattoon applies well to the Libman site, then the greater amount of energy will come from the South and then Northwest, with very little energy from other directions in comparison. The wind rose is used to help site the turbine so that it is an area with unobstructed wind flow in the predominant wind direction.

Energy Production and Financial Analysis

The proposed turbine site is approximately 656’ above sea level in an area fairly flat and free of immediate obstacles. The town and trees to the South will cause some reductions in wind speeds, and that was taken into consideration when calculating the turbine’s annual energy production.

The wind data from the Mattoon wind measurement site was used to model the wind speeds and energy production of the two turbines at the Libman site. The estimated production for the Vestas V82 on an 80m tall tower net output is approximately **3,900,000 kwhrs** and for the FL2500 on a 100m tower the net output **is 6,500,000** kwhrs per year. Both of those figures represent the conservative estimate number called the P90 number where the unit will meet or exceed that number 9 years out of 10. The P50 or average net output will be 10-12% higher. Rotor size (area) is the most important determinant of turbine production, and the area of the FL 2500 is 7854 square meters, largest available to date in the US.

Below is the wind speed modeling results from the WASP software. WASP is the world leading software used to model wind speeds using available wind data.

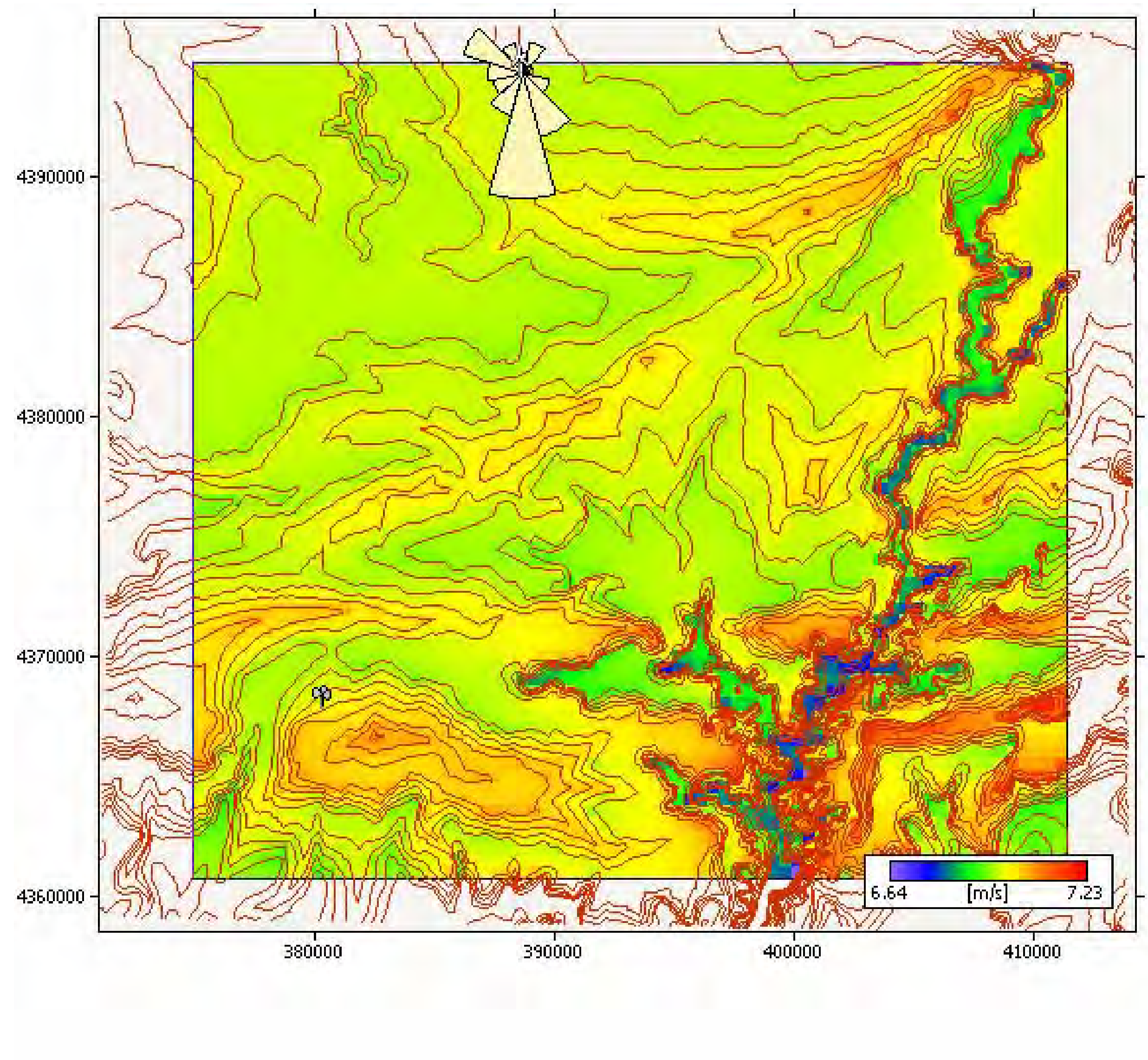


Figure 4- Modeled wind speeds in area, and turbine with wind rose
(the small cup anemometer symbol in the lower left corner is the Mattoon wind measurement site)

Below is the monthly predicted wind speed averages, turbine output and dollars of savings for two different turbine choices.

Tables 1 & 2 Sample Wind, Energy and Production

Fuhrlaender FL2500 on 100m tower

Month	Valid Data Points	Hub Height Wind Speed (m/s)	Time At Zero Output (%)	Time At Rated Output (%)	Mean Net Power Output (kW)	Mean Net Energy Output (kWh/yr)	Dollars Savings	Net Capacity Factor (%)
Jan	744	19.85	4.44	22.18	1,142.10	849,756	$60,435	45.7
Feb	696	16.84	6.61	12.79	855.1	574,659	$40,870	34.2
Mar	716	17.46	6.7	13.83	891.3	663,097	$47,159	35.7
Apr	731	18.45	6.02	15.46	1,059.90	763,152	$54,275	42.4
May	744	14.86	10.75	2.28	693.3	515,801	$36,684	27.7
Jun	387	13.63	13.44	6.46	536.8	386,485	$27,487	21.5
Jul	744	11.59	19.89	0.13	344.9	256,572	$18,247	13.8
Aug	744	10.28	20.03	0	222	165,163	$11,746	8.9
Sep	720	12.74	18.75	1.81	500.4	360,290	$25,624	20
Oct	744	17.13	5.65	11.29	887.6	660,376	$46,966	35.5
Nov	720	17.14	8.47	13.61	907.1	653,137	$46,451	36.3
Dec	664	16.02	11.3	11.3	757.1	563,306	$40,062	30.3
Overall	**8,354**	**15.56**	**10.93**	**9.32**	**739.7**	**6,480,033**	**$460,860**	**29.6**

Vestas V82 on 80m tower

Month	Valid Data Points	Hub Height Wind Speed (m/s)	Time At Zero Output (%)	Time At Rated Output (%)	Mean Net Power Output (kW)	Mean Net Energy Output (kWh/yr)	Dollars Savings	Net Capacity Factor (%)
Jan	744	19.16	4.44	6.99	708.2	526,921	$37,475	42.9
Feb	696	16.42	6.75	3.3	531.8	357,346	$25,414	32.2
Mar	716	16.83	7.12	2.37	549.3	408,664	$29,064	33.3
Apr	731	17.76	6.57	3.01	639.3	460,312	$32,737	38.7
May	744	14.14	11.16	0	405.1	301,386	$21,435	24.6
Jun	387	12.95	15.76	2.58	318.3	229,146	$16,297	19.3
Jul	744	10.91	21.51	0	194.9	144,983	$10,311	11.8
Aug	744	10.25	20.03	0	149.9	111,515	$7,931	9.1
Sep	720	12.27	18.47	0.28	295.1	212,477	$15,111	17.9
Oct	744	16.3	6.18	2.42	530.5	394,698	$28,071	32.2
Nov	720	16.35	8.47	1.11	537.4	386,922	$27,518	32.6
Dec	664	15.45	11.3	4.82	461	343,008	$24,395	27.9
Overall	**8,354**	**14.96**	**11.34**	**2.2**	**447.6**	**3,920,640**	**$278,836**	**27.1**

The energy savings are based on the following values provided by Ameren employee Kristi Fitzanko in June 2009. This is a contract price good through 2010. The in –service date is also assumed in 2010, and so the price will be the same when the project starts operating.

	Always
One rate	$0.07112

I assumed a 2% increase in energy cost per year after the first year.

For any additional energy generated that must be sold back to Ameren, the 2008 fixed price tariff sheet for Ameren IP has the following structure for primary voltage interconnected QF generators:

	Summer	Winter
Peak	$0.1054	$0.07898
Off peak	$0.0443	$0.0503

Since it is not known the exact quantity of energy that will be sold back to Ameren at the above tariff rates (less than 10%), and because the average of these rates is close to the $0.07112 price used in the model, this study will assume all the energy sold at the $0.07112 price.

The FL2500 on 100m tower shows a savings of $460,000 in year 1, and the Vestas V82 0n 80m tower shows a $279,000 annual energy savings.

Proposed 2 Turbine Types to Consider for Installation

Two turbines that are available today were chosen for analysis, these represent two possible sizes. There are smaller or larger turbines available, the results here will equally apply to those other machines. The basic summary is that the larger turbine, has somewhat better economics for this site. This is typical if the energy rate is the same for both choices, as the larger turbine has a greater production of energy from a proportional smaller increase in cost.

Vestas V82- 1650kW- GOOD CHOICE

There are many hundreds of Vestas V82's operating in Illinois today, and specifically there is a large number (more than 200) operating for over two years near Bloomington IL where a large operation and maintenance facility is staffed and includes trained technicians to service these machines and has spare parts available for common repairs. The risk for large component failure will be addressed through insurance and a reserve fund that builds each year. The Vestas 1650kW machine is predicted to generate approximately 3,903,000 kwhrs per year, with an estimated installed cost of $2,648,000 (assuming a 25% DOE grant). The economics of this project is moderate, with simple payback in year 13, and a 20 year return close to 8%.

Fuhrlander- 2500kW- BEST CHOICE

The FL 2500 with the large rotor, 100m, will provide a large number of kwhrs for the installed cost, creating the best economic returns. Specifically, it is predicted to generate 6,480,000 kwhrs per year with an installed cost of $4,868,000 (assuming a DOE grant for 25% of total project cost. This machine offers simple payback in 10 years, and a 20 year return greater than 9%. There would be additional challenges to interconnecting this machine behind all 4 meters, it will require additional negotiations with Ameren to determine what is possible. This machine will generate approximately half the amount of electricity used by Libman, but at times it may be exceed the Libman load and some electricity would be delivered to Ameren (this would be in the winter months). The economics shown in the Appendices are estimated assuming all the energy is valued at the full energy amount, but likely some will be sold back at a lower rate (perhaps 10% or less of the total). It will require 24 hour meter output to be obtained from each of the four meters for the off-peak months to determine the exact amount.

Interconnect

An underground powerline would carry the energy from the turbine to a point of interconnection and metering. Libman has four metering locations, at 480Volts. The turbine will need to have its voltage transformed to some intermediate voltage to avoid large line losses. Given that Libman's Ameren interconnect is at 12 kV on the high side of the transformer, that is the voltage the wind turbine energy will be transmitted to the interconnect point via underground wires.

Libman has 4 meters, and given that they are contemplating using Ameren's new QF rate for "behind the meter" type projects, the electricity needs to flow behind each meter (or two or three of them), or Ameren will treat the project as a larger generation process, involving more costly interconnection studies and a longer process.

These interconnects can be costly, requiring equipment to protect the utility from generation that might operate when it is unsafe, or create large voltage swings that cause light flicker. Those protection equipment costs were included in the financial analysis, but the exact items and costs are not known at this time.

Required Agreements and Permits

Illinois wind projects require County permits. A Douglas County Conditional Use permit would be required before the turbine could be built. Permitting involves 3-4 months of time, and some application fees. Building permits are also required and have more expensive fees based on the cost of the construction.

FAA declarations of no hazard to aviation can be obtained with little cost, with an electronic filing. This takes about 90 days. There are no airports in the area, so its possible this turbine would obtain the clearance up to 494' feet needed for the FL2500 or 397' for the Vestas V82.

Siting

A turbine location is recommended with this pre-feasibility study, and shown in the image below. There are sometimes setbacks required by the County that will require some accommodation, for example, typical County setback requirements are1.1 X overall tower height from property lines or roads. There are a number of wind projects adjacent to schools and manufacturing plants operating in the Midwest, several in Iowa have been successfully operating for 12 years, and new larger turbines were added several years ago as a result of the success of the program. Below are some issues that affect decisions on where to site wind turbines.

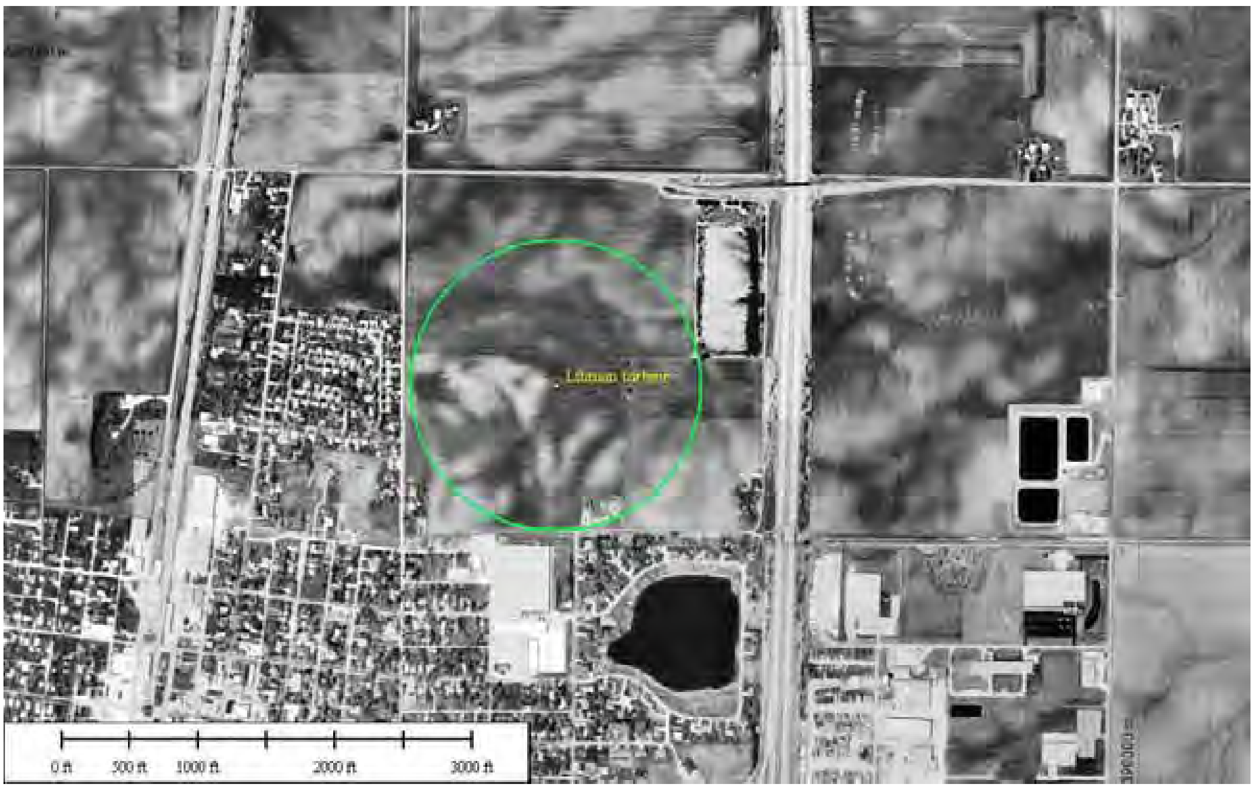


Figure 5- Libman turbine location and 1000' radius buffer (green circle)

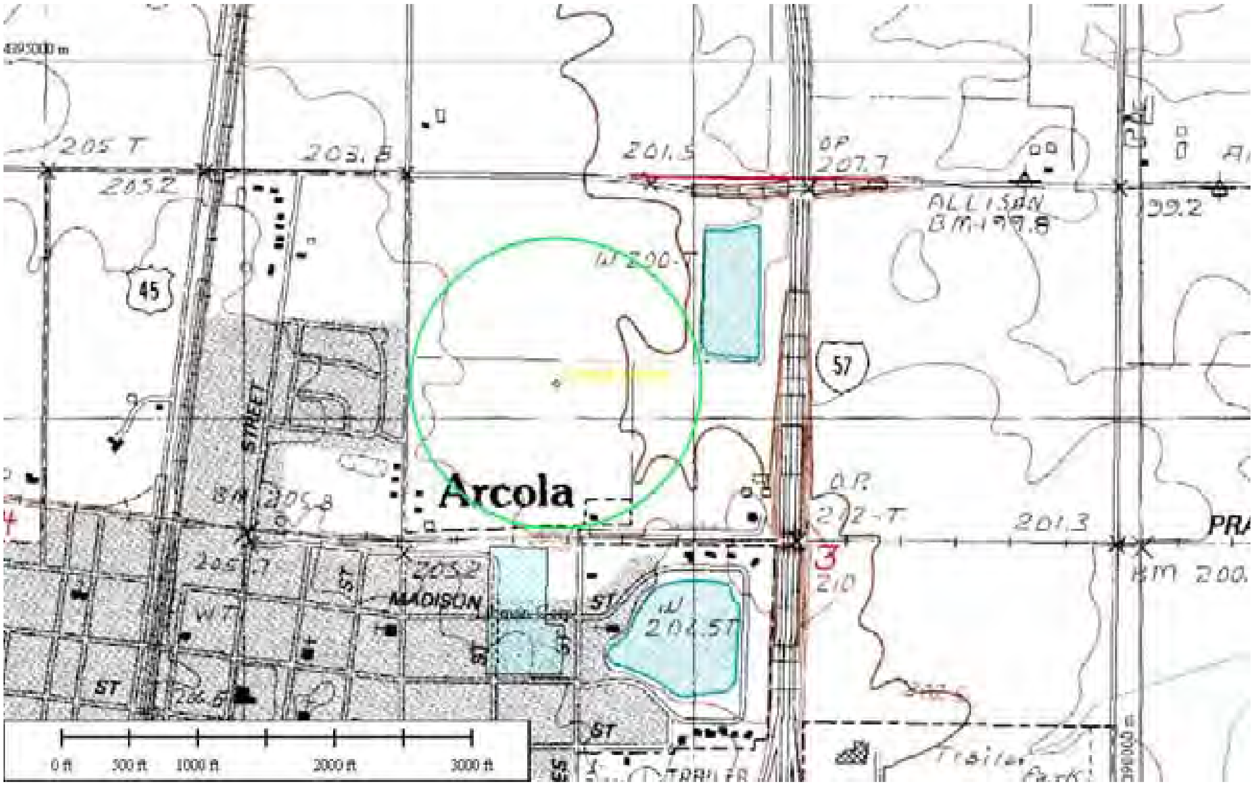


Figure 6- Libman turbine location on topo map (Libman building outline in blue)

Ice
Wind turbines do drop ice in the winter, the icefall occurs after a period of ice accumulation, the turbine is not operating in these icing conditions (it shuts itself off sensing any discrepancy between actual wind speed and power output, and power output falls dramatically when blades are iced). Siting the turbine where people do not walk beneath the arc of the blades is important in winter.

Sound
The turbines do create noise, although it's a relatively quiet aerodynamic swishing sound, less than 45 dB at 300-600 feet (depending on which turbine selected).

Visual effects
Finally there are times in the morning or evening when the turbine blades create either a shadow flicker or a strobing from effects from the blades and sunlight. This effect can be modeled. The turbine was sited to try and minimize the shadow flicker on the residences to the West, and to drivers along the Interstate.

Safety
The electrical wires are buried a minimum of 40" underground on the property, all electrical equipment is enclosed in locked steel enclosures or in the locked steel tower. The steel tubular tower is not accessible or climbable from the exterior. No member of the public has been seriously injured in the US from a wind turbine.

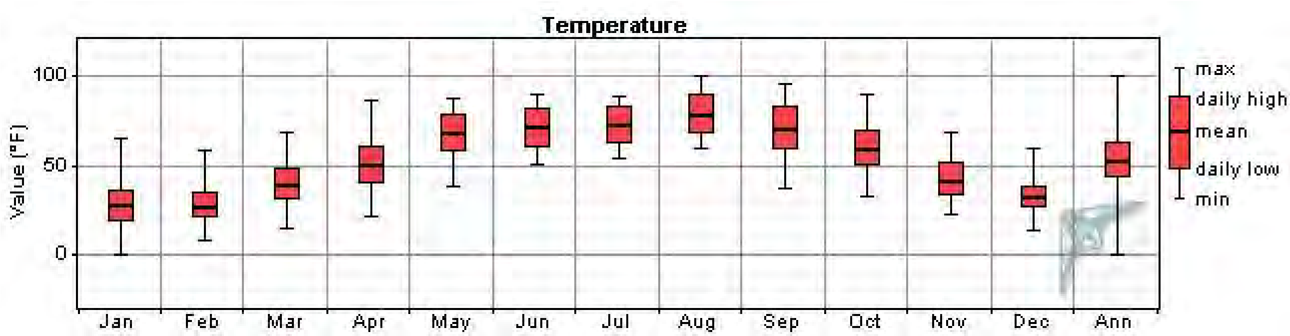
Appendix A

Mattoon Wind Data Analysis

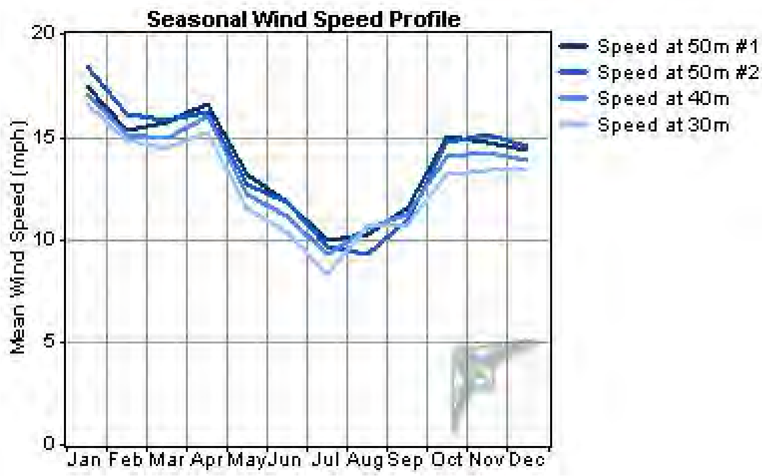
Data Set Properties

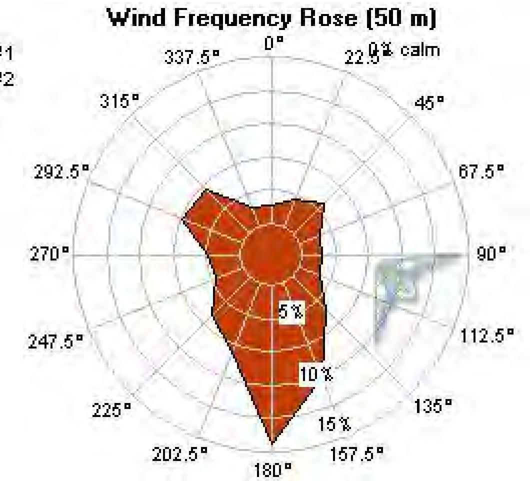
Data Set: Mattoon Wind data apr1 07 to apr1 08.windog
Report Created: 6/29/2009 17:02

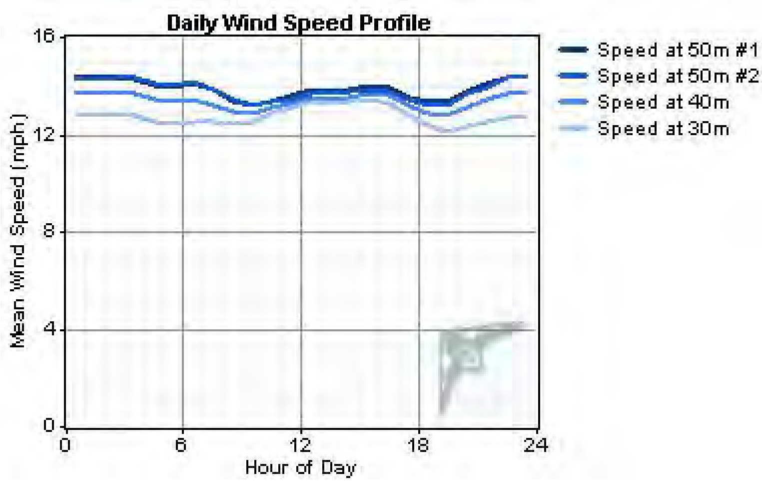
Variables	Values
Latitude	N 0° 37' 27.096"
Longitude	E 0° 89' 23.405"
Elevation	700 ft
Start date	4/1/2007 00:00
End date	4/1/2008 14:00
Duration	12 months
Length of time step	60 minutes
Calm threshold	0 mph
Mean temperature	52.4 °F
Mean pressure	98.79 kPa
Mean air density	1.211 kg/m³
Power density at 50m	253 W/m²
Wind power class	2 (Marginal)
Power law exponent	0.159
Surface roughness	0.0702 m
Roughness class	1.71
Roughness description	Crops

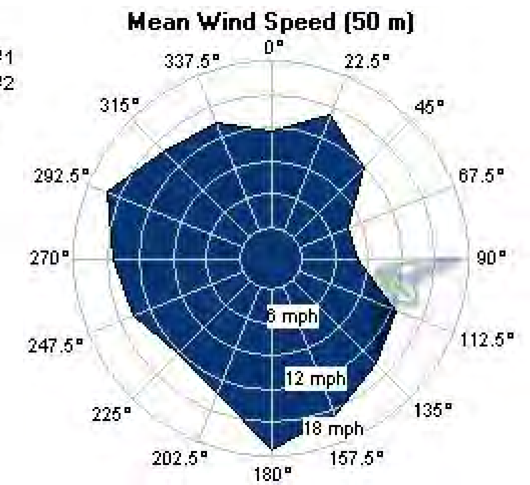


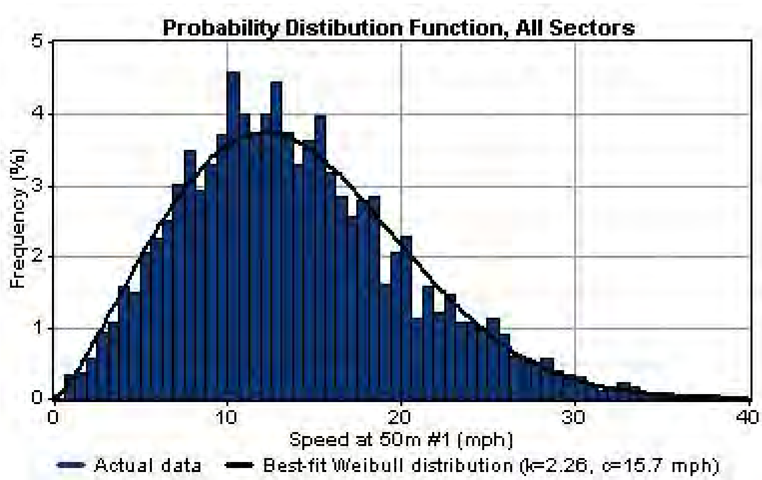
Wind Speed and Direction

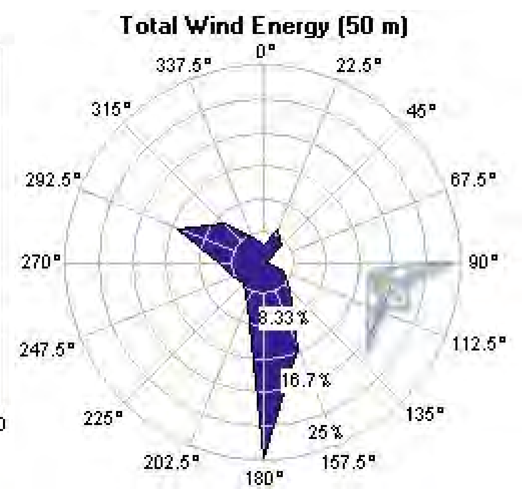




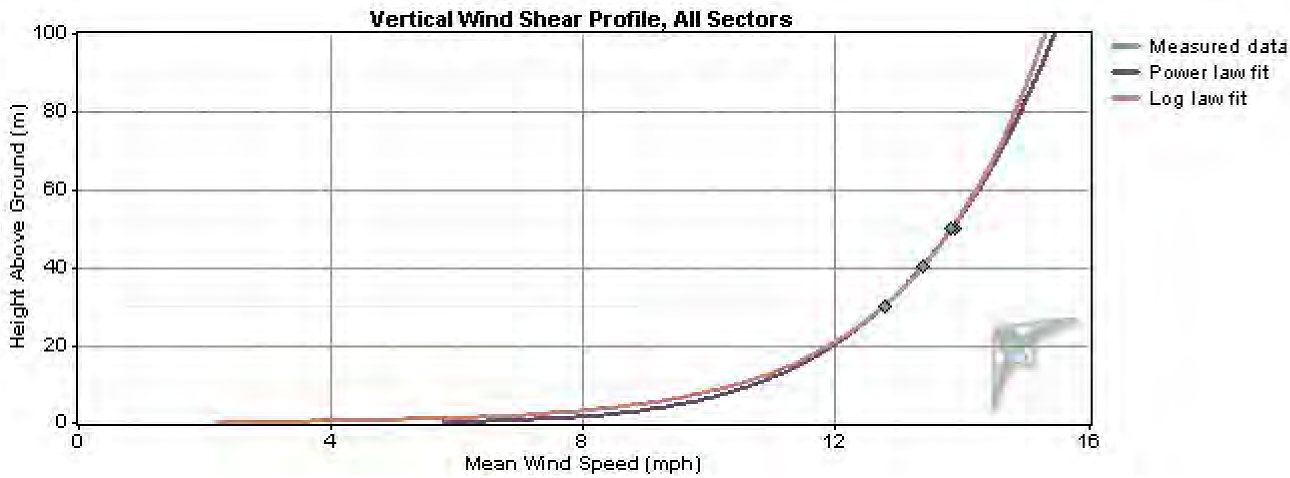


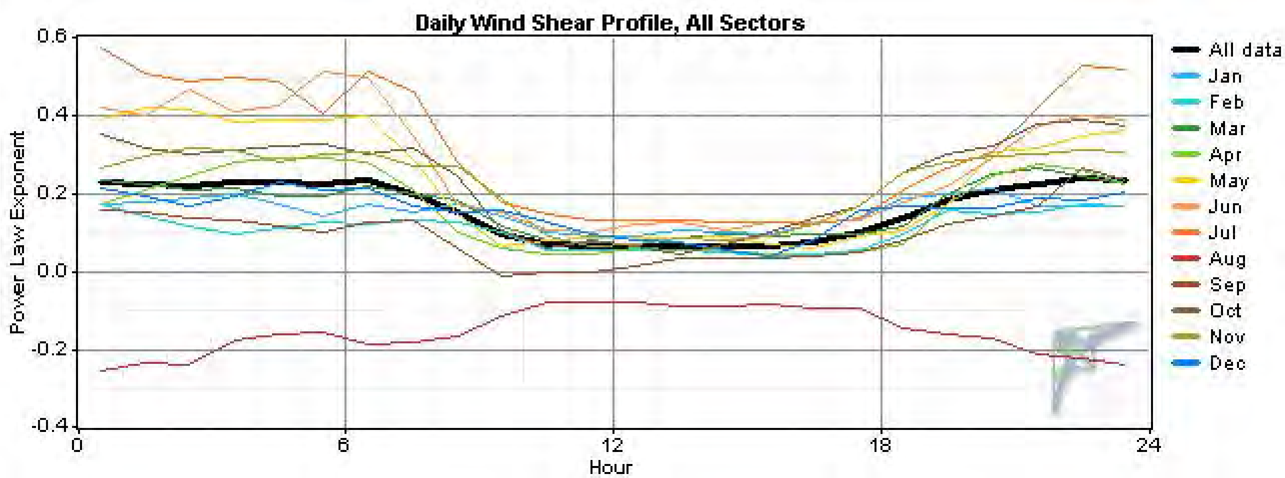


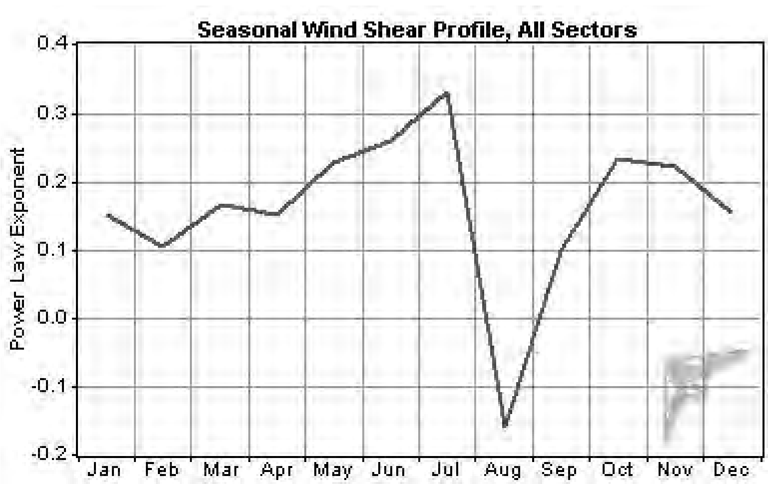


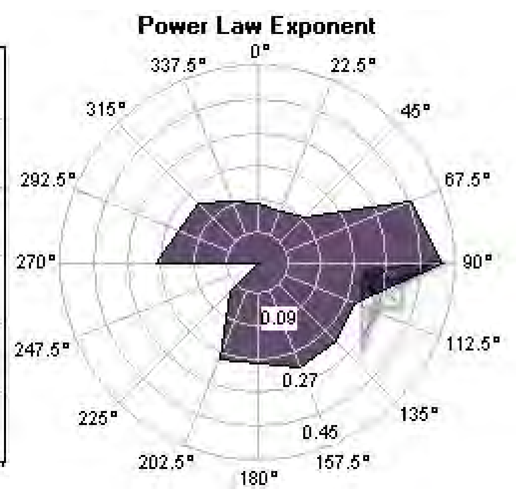


Wind Shear

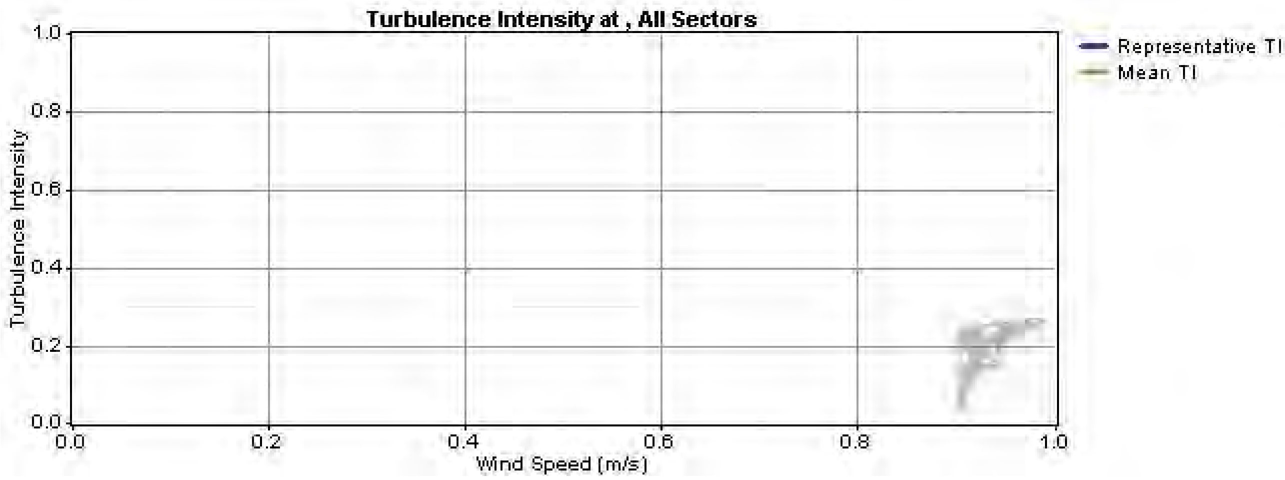

Vertical Wind Shear Profile, All Sectors
Height Above Ground (m)
Mean Wind Speed (mph)
Measured data
Power law fit
Log law fit

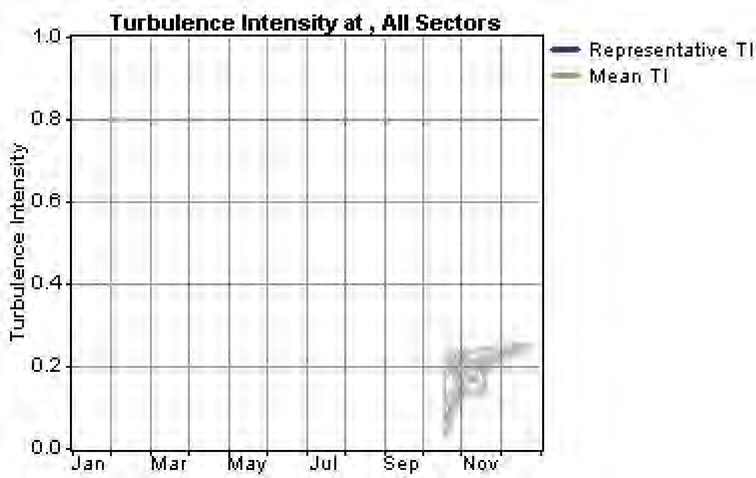

Daily Wind Shear Profile, All Sectors
Power Law Exponent
Hour
All data
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

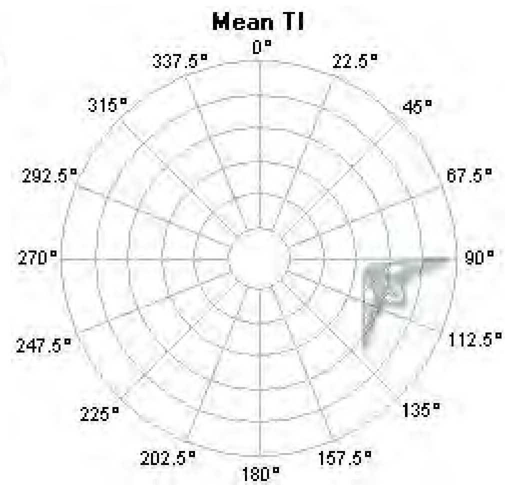

Seasonal Wind Shear Profile, All Sectors
Power Law Exponent
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

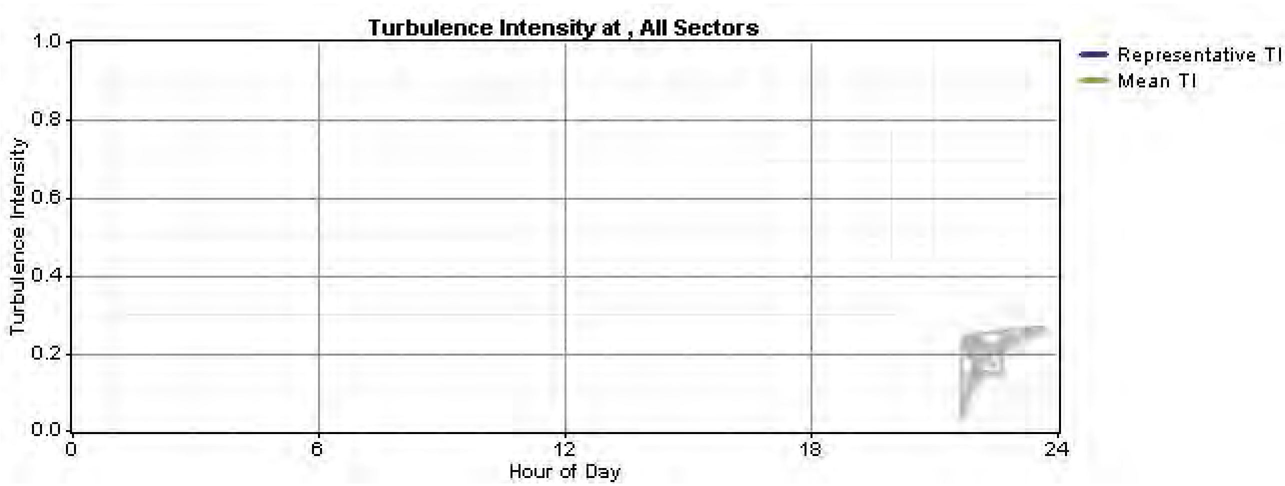

Power Law Exponent
0°
22.5°
45°
67.5°
90°
112.5°
135°
157.5°
180°
202.5°
225°
247.5°
270°
292.5°
315°
337.5°
0.09
0.27
0.45

Turbulence Intensity









Data Column Properties

Label	Units	Height	Possible Records	Valid Records	Recovery Rate (%)	Mean	Min	Max	Std. Dev
No.			8,798	8,465	96.22	4,233	1	8,465	2,444
Speed at 30m	mph	30 m	8,798	8,354	94.95	12.78	0.80	37.10	6.27
Speed at 40m	mph	40 m	8,798	8,354	94.95	13.38	0.80	38.30	6.35
Speed at 50m #1	mph	50 m	8,798	8,354	94.95	13.88	0.80	38.70	6.50
Speed at 50m #2	mph	50 m	8,798	8,354	94.95	13.83	0.80	39.60	6.83
Direction at 40m	°	40 m	8,798	8,456	96.11	184.1	0.0	359.0	93.7
Direction at 50m	°	50 m	8,798	8,459	96.15	185.1	0.0	359.0	93.9
Temperature at 2m	°F		8,798	8,461	96.17	52.38	-0.50	99.60	21.34

Appendix B

Financial Analysis, FL2500 and V82

Project Assumptions

Project Name		**Libman 1.65MW**
Turbine		Vestas V82
Number of turbines		1
Project Size in MW		1.65
Capacity Factor		27%
per turbine production (kwhr)		3,902,580
Annual Production (kWh)		3,902,580
Power Purchase Rate ($/kWh)	$	0.071
Green Tag Revenues ($/kWh)	$	-
Project Cost	$	3,531,000
Equity		
	$	-
DOE Grant	$	882,750
Equity Investor Contribution	$	1,648,250
Financing		
Total Equity	$	2,531,000
Term Debt	$	1,000,000
Debt Term in Years		12
Interest Rate		7.00%
Total Cash Payments (to Equity Investor)	$	-
Monthly Debt Payment	$	10,284
Per Yr Debt Payment	$	123,408
Ratios		
Tax Rate for Capital		35.15%
O & M Rate (% of revenues)		16.2%
Capital Cost per kWhr	$	0.90
Amortized IRR - 10 yr		-2.70%
Amortized IRR - Equity Investor		7.89%
Debt Coverage Ratio (ave yrs 1-10)		1.25

Turbine Costs	
Turbine, Tower and Blades	$2,500,000
Duties and Delivery to Site- included in price	$0
IL sales tax	$135,000
Engineering- Civil and Electrical	$55,000
Mobilization/Demobilization	$50,000
Electrical- Underground etc	$150,000
Interconnect-per turbine price	$180,000
Roads	$65,000
Foundations	$120,000
Erection	$160,000
Builders Risk Insurance	$45,000
project mgmt, legal	$65,000
FAA Lighting	$6,000
TOTAL	**$3,531,000**

Libman 1.65MW Pro Forma

	1	2	3	4	5	6	7	8	9	10
REVENUES	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
kWh/yr [1]	3,902,580	3,902,580	3,902,580	3,902,580	3,902,580	3,902,580	3,902,580	3,902,580	3,902,580	3,902,580
PPA Rate ($/kWh)	0.0711	0.0725	0.0740	0.0755	0.0770	0.0785	0.0801	0.0817	0.0833	0.0850
Electric Revenue	277,551	283,103	288,765	294,540	300,431	306,439	312,568	318,819	325,196	331,700
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**277,551**	**283,103**	**288,765**	**294,540**	**300,431**	**306,439**	**312,568**	**318,819**	**325,196**	**331,700**
EXPENSES										
Operation/Maintenance - Local [2]	1,500	1,530	1,561	1,592	1,624	1,656	1,689	1,723	1,757	1,793
Operation/Maintenance - Factory [2]	42,000	42,840	43,697	44,571	45,462	46,371	47,299	48,245	49,210	50,194
Electrical Usage	800	816	832	849	866	883	901	919	937	956
Insurance [3]	14,000	14,280	14,566	14,857	15,154	15,457	15,766	16,082	16,403	16,731
Property Tax	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500
Leaseholder Payments		0	0	0	0	0	0	0	0	0
Admin/Financial Management [3]	3,000	3,060	3,121	3,184	3,247	3,312	3,378	3,446	3,515	3,585
Repairs Reserve	35,000	35,700	36,414	37,142	37,885	38,643	39,416	40,204	41,008	41,828
Decommissioning Contingency	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Total Expenses - Annual	112,300	114,226	116,191	118,194	120,238	122,323	124,449	126,618	128,831	131,087
Debt Service Payment	123,408	123,408	123,408	123,408	123,408	123,408	123,408	123,408	123,408	123,408
Total Operating Expenses	235,708	237,634	239,599	241,602	243,646	245,731	247,857	250,026	252,239	254,495
Net Cash(per Annual Cash Reserve)	41,843	45,469	49,166	52,938	56,784	60,708	64,711	68,793	72,957	77,204
DEBT COVERAGE										
Accumulating Gross Reserves	49,343	103,299	163,064	228,393	299,530	376,724	460,236	550,336	647,303	751,427
Accumulating Net Reserve	41,843	88,149	139,078	194,797	255,477	321,295	392,432	469,073	551,412	639,644
Debt Coverage Ratio	1.18	1.19	1.21	1.22	1.23	1.25	1.26	1.28	1.29	1.30
Average Coverage Ratio(Yrs 1-12)	1.25									
EQUITY PROVIDER AFTER TAX BASIS										
Federal PTC Value	0	0	0	0	0	0	0	0	0	0
Depreciation Value (35%)	175,750	281,200	168,720	101,232	101,232	50,616	0	0	0	0
Income Tax	?	?	?	?	?	?	?	?	?	?
Total Tax Value	**175,750**	**281,200**	**168,720**	**101,232**	**101,232**	**50,616**	**0**	**0**	**0**	**0**
Tax and Revenue Total	**217,593**	**326,669**	**217,886**	**154,170**	**158,016**	**111,324**	**64,711**	**68,793**	**72,957**	**77,204**

Notes:

[1] Decreases 1% per annum beginning year 11

[2] Increases 2% per annum

Libman 1.65MW

	11	12	13	14	15	16	17	18	19	20
REVENUES	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
kWh/yr [1]	3,863,554	3,824,919	3,786,669	3,748,803	3,711,315	3,674,202	3,637,460	3,601,085	3,565,074	3,529,423
PPA Rate ($/kWh)	0.0867	0.0884	0.0902	0.0920	0.0938	0.0957	0.0976	0.0996	0.1016	0.1036
Electric Revenue	334,950	338,233	341,548	344,895	348,275	351,688	355,134	358,615	362,129	365,678
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**334,950**	**338,233**	**341,548**	**344,895**	**348,275**	**351,688**	**355,134**	**358,615**	**362,129**	**365,678**
EXPENSES										
Operation/Maintenance - Local [2]	1,828	1,865	1,902	1,940	1,979	2,019	2,059	2,100	2,142	2,185
Operation/Maintenance - Factory [2]	51,198	52,222	53,266	54,331	55,418	56,526	57,657	58,810	59,986	61,186
Electrical Usage	975	995	1,015	1,035	1,056	1,077	1,098	1,120	1,143	1,165
Insurance [3]	17,066	17,407	17,755	18,110	18,473	18,842	19,219	19,603	19,995	20,395
Property Tax	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500
Leaseholder Payments	0	0	0	0	0	0	0	0	0	0
Admin/Financial Management [3]	3,657	3,730	3,805	3,881	3,958	4,038	4,118	4,201	4,285	4,370
Repairs Reserve	42,665	43,518	44,388	45,276	46,182	47,105	48,047	49,008	49,989	50,988
Decommissioning Contingency	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Total Expenses - Annual	130,889	133,237	135,632	138,074	140,566	143,107	145,699	148,343	151,040	153,791
Debt Service Payment	123,408	123,408								
Total Operating Expenses	254,297	256,645	135,632	138,074	140,566	143,107	145,699	148,343	151,040	153,791
Net Cash(per Annual Cash Reserve)	80,653	81,588	205,916	206,820	207,709	208,581	209,435	210,271	211,089	211,887
DEBT COVERAGE										
Accumulating Gross Reserves	859,623	971,999	1,212,075	1,460,258	1,716,774	1,981,858	2,255,749	2,538,693	2,830,943	3,132,758
Accumulating Net Reserve	733,090	829,340	1,051,843	1,279,700	1,513,003	1,751,844	1,996,316	2,246,514	2,502,533	2,764,470
Debt Coverage Ratio	1.32	1.32								
Average Coverage Ratio(Yrs 1-12)										
EQUITY PROVIDER AFTER TAX BASIS										
Federal PTC Value										
Depreciation Value (35%)										
Income Tax										
Total Tax Value										
Tax and Revenue Total	**80,653**	**81,588**	**205,916**	**206,820**	**207,709**	**208,581**	**209,435**	**210,271**	**211,089**	**211,887**

Notes:
[1] Decreases 1% per annum beginning year 11
[2] Increases 2% per annum

Federal Bonus Depreciation as Applied to MACRS-GDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Basis		2,500,000						
First Year BonusDeprec.	0%	0						
Reduced Basis		2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	
Year 1 -- MACRS	20%	500,000						
Year 2 -- MACRS	32%		800,000					
Year 3 -- MACRS	19.2%			480,000				
Year 4 -- MACRS	11.52%				288,000			
Year 5 -- MACRS	11.52%					288,000		
Year 6 -- MACRS	5.76%						144,000	
Total Depreciation		500,000	800,000	480,000	288,000	288,000	144,000	**2,500,000**
								1,125,000

Internal Rate of Return - Project

Initial Cash	**$**	**1,648,250**
Years		**10**

Yr. No.	Year	Cash out		Cash	IRR
1	2009	1,648,250	$	(1,648,250)	-
1	2009	-		217,593	
2	2010	-		326,669	
3	2011	-		217,886	
4	2012	-		154,170	
5	2013	-	$	158,016	
6	2014	-	$	111,324	-
7	2015	-	$	64,711	-
8	2016	-	$	68,793	-
9	2017		$	72,957	
10	2018		$	77,204	
			$	**1,469,323**	**-2.70%**

Internal Rate of Return - Equity Investor

Initial Cash	**$**	**1,648,250**
Years		**10**

Yr. No.	Year	Cash out		Cash	IRR
1	2009	1,648,250	$	(1,648,250)	-
1	2009	-		217,593	
2	2010	-		326,669	
3	2011	-		217,886	
4	2012	-		154,170	
5	2013	-		158,016	
6	2014	-		111,324	-
7	2015	-		64,711	-
8	2016	-		68,793	-
9	2017			72,957	
10	2018			77,204	
11	2019			80,653	
12	2020			81,588	
13	2021			205,916	
14	2022			206,820	
15	2023			207,709	
16	2024			208,581	
17	2025			209,435	
18	2026			210,271	
19	2027			211,089	
20	2028			211,887	
			$	**3,303,273**	**7.89%**

Project Assumptions

Project Name		Libman 2.5MW
Turbine		Fuhrlander 2.5MW
Number of turbines		1
Project Size in MW		2.5
Capacity Factor		30%
per turbine production (kwhr)		6,504,300
Annual Production (kWh)		6,504,300
Power Purchase Rate ($/kWh)	$	0.071
Green Tag Revenues ($/kWh)	$	-
Project Cost	$	6,490,600
Equity		
	$	-
DOE Grant	$	1,622,650
Equity Investor Contribution	$	2,867,950
Financing		
Total Equity	$	4,490,600
Term Debt	$	2,000,000
Debt Term in Years		12
Interest Rate		7.00%
Total Cash Payments (to Equity Investor)	$	-
Monthly Debt Payment	$	20,567
Per Yr Debt Payment	$	246,804
Ratios		
Tax Rate for Capital		35.15%
O & M Rate (% of revenues)		12.6%
Capital Cost per kWhr	$	1.00
Amortized IRR - 10 yr		-0.68%
Amortized IRR - Equity Investor		9.33%
Debt Coverage Ratio (ave yrs 1-10)		1.28

Turbine Costs	
Turbine, Tower and Blades	$4,900,000
Duties and Delivery to Site- included in price	$0
IL sales tax	$264,600
Engineering- Civil and Electrical	$55,000
Mobilization/Demobilization	$50,000
Electrical- Underground etc	$190,000
Interconnect-per turbine price	$250,000
Roads	$65,000
Foundations	$175,000
Erection	$375,000
Builders Risk Insurance	$85,000
project mgmt, legal	$75,000
FAA Lighting	$6,000
TOTAL	**$6,490,600**

Libman 2.5MW Pro Forma

	1	2	3	4	5	6	7	8	9	10
REVENUES	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
kWh/yr [1]	6,504,300	6,504,300	6,504,300	6,504,300	6,504,300	6,504,300	6,504,300	6,504,300	6,504,300	6,504,300
PPA Rate ($/kWh)	0.0711	0.0725	0.0740	0.0755	0.0770	0.0785	0.0801	0.0817	0.0833	0.0850
Electric Revenue	462,586	471,838	481,274	490,900	500,718	510,732	520,947	531,366	541,993	552,833
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**462,586**	**471,838**	**481,274**	**490,900**	**500,718**	**510,732**	**520,947**	**531,366**	**541,993**	**552,833**
EXPENSES										
Operation/Maintenance - Local [2]	1,500	1,530	1,561	1,592	1,624	1,656	1,689	1,723	1,757	1,793
Operation/Maintenance - Factory [2]	55,000	56,100	57,222	58,366	59,534	60,724	61,939	63,178	64,441	65,730
Electrical Usage	1,200	1,224	1,248	1,273	1,299	1,325	1,351	1,378	1,406	1,434
Insurance [3]	18,000	18,360	18,727	19,102	19,484	19,873	20,271	20,676	21,090	21,512
Property Tax [3]	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
Leaseholder Payments		0	0	0	0	0	0	0	0	0
Admin/Financial Management [3]	3,000	3,060	3,121	3,184	3,247	3,312	3,378	3,446	3,515	3,585
Repairs Reserve	40,000	40,800	41,616	42,448	43,297	44,163	45,046	45,947	46,866	47,804
Decommissioning Contingency	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Total Expenses - Annual	141,700	144,074	146,495	148,965	151,485	154,054	156,675	159,349	162,076	164,857
Debt Service Payment	246,804	246,804	246,804	246,804	246,804	246,804	246,804	246,804	246,804	246,804
Total Operating Expenses	388,504	390,878	393,299	395,769	398,289	400,858	403,479	406,153	408,880	411,661
Net Cash(per Annual Cash Reserve)	74,082	80,960	87,975	95,130	102,429	109,874	117,467	125,213	133,113	141,171
DEBT COVERAGE										
Accumulating Gross Reserves	84,082	176,723	279,999	393,530	517,765	653,171	800,234	959,454	1,131,350	1,316,462
Accumulating Net Reserve	74,082	156,523	247,628	347,711	457,094	576,110	705,100	844,414	994,416	1,155,475
Debt Coverage Ratio	1.19	1.21	1.22	1.24	1.26	1.27	1.29	1.31	1.33	1.34
Average Coverage Ratio(Yrs 1-12)	1.28									
EQUITY PROVIDER AFTER TAX BASIS										
Federal PTC Value	0	0	0	0	0	0	0	0	0	0
Depreciation Value (35%)	344,470	551,152	330,691	198,415	198,415	99,207	0	0	0	0
Income Tax	?	?	?	?	?	?	?	?	?	?
Total Tax Value	**344,470**	**551,152**	**330,691**	**198,415**	**198,415**	**99,207**	**0**	**0**	**0**	**0**
Tax and Revenue Total	**418,552**	**632,112**	**418,666**	**293,545**	**300,844**	**209,081**	**117,467**	**125,213**	**133,113**	**141,171**

Notes:
[1] Decreases 1% per annum beginning year 11
[2] Increases 2% per annum

Libman 2.5MW F

	11	12	13	14	15	16	17	18	19	20
REVENUES	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
kWh/yr [1]	6,439,257	6,374,864	6,311,116	6,248,005	6,185,525	6,123,669	6,062,433	6,001,808	5,941,790	5,882,372
PPA Rate ($/kWh)	0.0867	0.0884	0.0902	0.0920	0.0938	0.0957	0.0976	0.0996	0.1016	0.1036
Electric Revenue	558,251	563,721	569,246	574,825	580,458	586,146	591,891	597,691	603,548	609,463
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**558,251**	**563,721**	**569,246**	**574,825**	**580,458**	**586,146**	**591,891**	**597,691**	**603,548**	**609,463**
EXPENSES										
Operation/Maintenance - Local [2]	1,828	1,865	1,902	1,940	1,979	2,019	2,059	2,100	2,142	2,185
Operation/Maintenance - Factory [2]	67,045	68,386	69,753	71,148	72,571	74,023	75,503	77,013	78,554	80,125
Electrical Usage	1,463	1,492	1,522	1,552	1,583	1,615	1,647	1,680	1,714	1,748
Insurance [3]	21,942	22,381	22,828	23,285	23,751	24,226	24,710	25,204	25,708	26,223
Property Tax [3]	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
Leaseholder Payments	0	0	0	0	0	0	0	0	0	0
Admin/Financial Management [3]	3,657	3,730	3,805	3,881	3,958	4,038	4,118	4,201	4,285	4,370
Repairs Reserve	48,760	49,735	50,730	51,744	52,779	53,835	54,911	56,010	57,130	58,272
Decommissioning Contingency	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Total Expenses - Annual	162,695	165,589	168,540	171,551	174,622	177,755	180,950	184,209	187,533	190,923
Debt Service Payment	246,804	246,804								
Total Operating Expenses	409,499	412,393	168,540	171,551	174,622	177,755	180,950	184,209	187,533	190,923
Net Cash(per Annual Cash Reserve)	148,752	151,329	400,706	403,273	405,836	408,392	410,941	413,482	416,016	418,540
DEBT COVERAGE										
Accumulating Gross Reserves	1,509,708	1,711,328	2,168,374	2,641,698	3,131,785	3,639,130	4,164,245	4,707,655	5,269,900	5,851,537
Accumulating Net Reserve	1,327,337	1,505,213	1,936,022	2,378,016	2,831,412	3,296,432	3,773,302	4,262,250	4,763,511	5,277,321
Debt Coverage Ratio	1.36	1.37								
Average Coverage Ratio(Yrs 1-12)										
EQUITY PROVIDER AFTER TAX BASIS										
Federal PTC Value										
Depreciation Value (35%)										
Income Tax										
Total Tax Value										
Tax and Revenue Total	**148,752**	**151,329**	**400,706**	**403,273**	**405,836**	**408,392**	**410,941**	**413,482**	**416,016**	**418,540**

Notes:
[1] Decreases 1% per annum beginning year 11
[2] Increases 2% per annum

Federal Bonus Depreciation as Applied to MACRS-GDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Basis		4,900,000						
First Year BonusDeprec.	0%	0						
Reduced Basis		4,900,000	4,900,000	4,900,000	4,900,000	4,900,000	4,900,000	
Year 1 -- MACRS	20%	980,000						
Year 2 -- MACRS	32%		1,568,000					
Year 3 -- MACRS	19.2%			940,800				
Year 4 -- MACRS	11.52%				564,480			
Year 5 -- MACRS	11.52%					564,480		
Year 6 -- MACRS	5.76%						282,240	
Total Depreciation		980,000	1,568,000	940,800	564,480	564,480	282,240	**4,900,000**
								2,205,000

Internal Rate of Return - Project

Initial Cash **$ 2,867,950**
Years **10**

Yr. No.	Year	Cash out		Cash	IRR
1	2010	2,867,950	$	(2,867,950)	-
1	2010	-		418,552	
2	2011	-		632,112	
3	2012	-		418,666	
4	2013	-		293,545	
5	2014	-	$	300,844	
6	2015	-	$	209,081	-
7	2016	-	$	117,467	-
8	2017	-	$	125,213	-
9	2018		$	133,113	
10	2019		$	141,171	
			$	**2,789,764**	**-0.68%**

Internal Rate of Return - Equity Investor

Initial Cash **$ 2,867,950**
Years **10**

Yr. No.	Year	Cash out		Cash	IRR
1	2010	2,867,950	$	(2,867,950)	-
1	2010	-		418,552	
2	2011	-		632,112	
3	2012	-		418,666	
4	2013	-		293,545	
5	2014	-		300,844	
6	2015	-		209,081	-
7	2016	-		117,467	-
8	2017	-		125,213	-
9	2018			133,113	
10	2019			141,171	
11	2020			148,752	
12	2021			151,329	
13	2022			400,706	
14	2023			403,273	
15	2024			405,836	
16	2025			408,392	
17	2026			410,941	
18	2027			413,482	
19	2028			416,016	
20	2029			418,540	
			$	**6,367,030**	**9.33%**

Attachment D-3b

Libman Company Feasibility Report- 3 600 kW Turbines Alternative (Sep-2009)

Libman Company Feasibility Report- 3 600kW turbines alternative

Sep 16, 2009

Prepared by:

Wes Slaymaker, P.E.
WES Engineering LLC
706 S. Orchard St
Madison, WI 53715
608-259-9304
wes@WESengineering.com

Introduction

This report describes the energy production for an alternate of three smaller 600kW turbines instead of one large 1500kW for Libman Company

The financial feasibility of the project is based on assumptions including obtaining available grants, and assumed 2% per year inflation. Precise costs for a project at this site will require a more extensive feasibility study and a design/build estimate.

Executive Summary

The Libman Company LLC wind project site has several advantages for a mid-sized wind project in Illinois, these are a good wind resource due to this relatively high and open area in central Illinois, and the low cost and close access interconnection to the utility switchgear on the property

This report describes current economics of the Libman Company LLC wind project assuming the use of State and Federal grants, and assumed value of electricity through a power purchase agreement starting at 5.5 cents/kwhr and increasing 2% per year.

This is just analysis of an alternate scenario consisting of three 600kW turbines. The turbine installed cost versus output always favors larger turbines, and that is the case with the Libman project such that the installation of quantity 3 of the 600kW wind turbines with total installed capacity of 1.8 MW has a simple payback longer than the project life and is not recommended. The financial spreadsheets in Appendix A show all assumptions, including borrowing at 7% interest rate for 10 year term the maximum amount that a bank will loan and still have good debt coverage every year.

Grants

The largest source of grant monies available today are through the Department of Energy for up to 30% of total project cost. This program requires the project to have construction start before the end of 2010 and begin commercial operation by Jan 1, 2013. There is a Federal accelerated depreciation with the acronym MACRS that allows for depreciation of the equipment over a 5 year period. In the financial analysis it was assumed the project received a 30% grant, and the 5 year accelerated depreciation.

There is a new Illinois grant program offered through the Department of Commerce and Economic Opportunity (DCEO), with grants for “Community Wind” projects up to $500,000. It was assumed the project received a $500,000 grant from the State.

There is a low interest loan program available for renewable energy generators through the Illinois Finance Authority (IFA), the IFA provides the bank which is loaning money to the project a low interest subordinate loan for a portion of the total. This benefit is subject to application and approval and it was not assumed the project received a low interest loan.

Project Site

Image 1- Libman Company LLC project site with aerial photo background

Image 2- Libman Company LLC site with topographical map background

The above two images show possible array of three turbines on the project site, these approximate locations were provided by the Client and were used to model the wind energy production from several turbines installed at those locations. All turbines are within the setback area shown of 110% total turbine height setback from the property line, these are setbacks that the City and County will ask for in the Conditional Use permit application process.

The project cost assumptions are based on a single access road connecting each turbine, and underground wire connecting each turbine together and then to the 12.47 kV switchgear at the southeast edge of the project site. The underground wire distance is approximately 3100 feet and the road distance is approximately 1900 feet. The average distance between turbines is 950 feet.

Wind Data and Energy Production

A separate wind report details wind speeds at the site. The 60m hub height speed for the 600kW turbine is predicted to be 6.05 m/s, annual average.

Energy Production and Financial Analysis

The proposed turbine area is approximately 660' above sea level in an area fairly flat and free of immediate obstacles. The town and trees to the South will cause some reductions in wind speeds, and that was taken into consideration when calculating the turbine's annual energy production by reducing the gross energy estimate by an additional amount to compensate for the effect of nearby city. This reduction is approximately 15% and reflects losses for downtime for service, icing of blades, electrical losses in the underground wires and transformer, and yawing of the turbine (turning into the wind).

The wind data from the nearby wind measurement site was used to model the wind speeds and energy production for the T600 600kW turbine on a 60m tower the net output **is 998,640 kwhrs per turbine** per year. This figure represents the average production estimate number called the P50 number where the unit will meet or exceed that number 5 years out of 10. The P90 number sometimes used for financing represents the production output 9 years out of 10 and will be 15-20% lower than the P50 number. There are a few other turbines available in this size range and the economics for each will be similar to that shown above.

Below is the monthly predicted wind speed averages, and turbine output for the two different turbine choices, this Table was created in Windographer software so the wind speed average and total annual output varies slightly from the WASP output, as well as having the net production and capacity factor shown where the gross after wake loss number from WASP is reduced 12%.

Month	Valid Data Points	Hub Height Wind Speed (m/s)	Time At Zero Output (%)	Time At Rated Output (%)	Mean Net Power Output (kW)	Mean Net Energy Output (kWh/yr)	Net Capacity Factor (%)
Jan	4,296	6.47	4.66	3.05	141.6	105,318	23.6
Feb	4,018	6.11	7.39	5.25	117.7	79,062	19.6
Mar	4,464	6.55	2.42	2.02	132.5	98,550	22.1
Apr	4,320	7.11	5.25	3.80	170.3	122,592	28.4
May	4,464	6.23	2.55	2.04	111.2	82,738	18.5
Jun	4,320	5.03	10.23	0.28	63.8	45,914	10.6
Jul	3,744	4.42	12.39	0.13	39.9	29,701	6.7
Aug	4,464	4.75	8.60	0.02	46.4	34,534	7.7
Sep	4,320	5.87	6.76	0.00	99.4	71,602	16.6
Oct	1,842	6.27	4.94	0.98	116.6	86,784	19.4
Nov	4,272	6.78	3.25	0.70	144.9	104,304	24.1
Dec	4,454	7.16	3.26	5.43	167.3	124,502	27.9
Overall	48,978	6.07	5.93	2.03	113.2	991,743	18.9

Table 1 Wind, Energy and Production Libman site T600

The project income stream was evaluated using an assumed average power purchase price for customer of $0.055/kWh.
Consultant assumed a 2% increase in energy cost per year after the first year.

Using the PPA rate of 7.5 cents/kWh, the WES30 on 50m tower shows a gross income of **$32,000** in year 1, and the T600 on a 60m tower shows a **$122,250** gross income in year 1.

<u>Proposed Turbine Type to Consider for Installation</u>

A turbine that is available today in the mid size range of 200kW to 750kW was chosen for analysis, this represents a possible turbine amongst a total of approximately 6 turbines made by various manufacturers in this size range. There are smaller or larger turbines available, the results here will equally apply to those other machines.

Elecon T600- 600kW

Elecon is a manufacturer of gearboxes for the wind and mining industry. They purchased the T600 design from a Belgian company called Turbowind. This design is modern and advanced, with a two speed generator allowing better energy capture at low wind speeds, as well as an “active stall” blade pitch design that allows the blades to be turned slightly as the generator reaches its rated output to allow the machine to stay at the rated output as wind speeds increase rather than a decrease in power as wind increases due to the aerodynamic “stall” of the wind over a fixed pitch blade. The Consultant visited an operating T600 in Boston, MA in May 2009 and observed this machine in operation and interviewed the owner. The owner was overall satisfied with the machine and had ordered 6 more for other projects, they did have one large issue at the site where the utility meter ran backwards but that may likely be an issue not associated with the turbine design. The machine was very quiet and also has good performance in low wind areas, with a large 48m rotor (157’), when most 600kW machines have a 44-47m rotor size. There are several installed machines in the US and several hundred operating machines in Europe and Asia.

The Elecon turbine is manufactured in Europe and India and sold through a US distributor called Reflecting Blue, which has offices in Chicago, IL and Las Vegas, NV.

There is additional information on each of these turbines in Appendix B.

Required Agreements and Permits

Illinois wind projects require Conditional Use permits. An Arcola City or County Conditional Use permit would be required before the turbines could be built. Permitting involves 3-4 months of time, and some application fees. Building permits are also required and have more expensive fees based on the cost of the construction.

FAA declarations of no hazard to aviation can be obtained with little cost, with an electronic filing. This takes about 90 days. The previous FAA permit for 492’ on the project parcel indicates FAA issues will not occur.

Ice

Wind turbines do drop ice in the winter, the icefall occurs after a period of ice accumulation, the turbine is not operating in these icing conditions (it shuts itself off sensing any discrepancy between actual wind speed and power output, and power output falls dramatically when blades are iced). Siting the turbine where people do not walk or park their cars beneath the arc of the blades is important in winter.

Sound

The turbines do create noise, although it's a relatively quiet aerodynamic swishing sound, less than 45 dB at 300-600 feet for this smaller turbine. The Interstate Highway noise will mask the turbine noise at this location

Visual effects

Finally there are times in the morning or evening when the turbine blades create either a shadow flicker or a strobing from effects from the blades and sunlight. This effect can be modeled (see comments above in the paragraph beginning the siting section of this report).

Safety

The electrical wires are buried a minimum of 40" underground on the property, all electrical equipment is enclosed in locked steel enclosures or in the locked steel tower. The steel tubular tower is not accessible or climbable from the exterior. No member of the public has been seriously injured in the US from a wind turbine.

The next steps for the project are outlined below, these can be worked on simultaneously.

- Met tower- install minimum height 50m (165') tall wind measurement instruments and record data for a year to better predict turbine energy from the site.
- Shadow flicker- Determine all locations of occupied residences or other "sensitive receptors" and then model the shadow flicker influence of the turbines at each of those locations. This map and table of hours will be used at the time the project applies for permits.
- Apply for Grants- There are various State and Federal grant programs for renewable energy projects, applications should be made to try and obtain funding from these programs. They have construction deadlines of approximately three years from time of grant award, ample time for this project to be able to construct and utilize the grant.

Appendix A

Financial Analysis, for T600 project

Project Assumptions

Project Name		**Libman (3) 600kW**
Turbine		Elecon 600kW 60m
Number of turbines		3
Project Size in MW		1.8
Capacity Factor		19%
per turbine production (kwhr)		998,640
Annual Production (kWh)		2,995,920
Power Purchase Rate ($/kWh)	$	0.055
Project Cost	$	5,220,000
Equity		
After Grant Total	$	3,154,000
(Federal Grant- 30% of Total)	$	1,566,000
(DCEO Grant)	$	500,000
Financing		
Total Equity	$	2,154,000
Term Debt	$	1,000,000
Debt Term in Years		10
Interest Rate		7.00%
Total Cash Payments (to Equity Investor)	$ 0	
Monthly Debt Payment	$	29,027
Per Yr Debt Payment	$	139,330
Ratios		
Tax Rate for Capital		35.15%
O & M Rate (% of revenues)		9.4%
Capital Cost per kWhr	$	1.74
Amortized IRR - 10 yr		
Amortized IRR -20yr		

Per Turbine Costs	
Turbine, and Blades	$1,000,000
Tower add	$190,000
sales tax (assumed Enterprise Zone or deferrment)	$0
Total per turbine	**$1,190,000**
transformer	$28,000
Engineering	$30,000
Construction Insurance	$25,000
Permits	$9,000
Electrical- underground and tower wiring	$78,000
Roads	$35,000
Foundations	$145,000
Erection	$135,000
Testing and Commissioning	$30,000
project mgmt, legal	$28,000
FAA Lighting	$7,000
Total BOP for Project	**$550,000**
TOTAL	**$1,740,000**

Libman (3) 600kW Pro Forma

	1	2	3	4	5	6	7	8	9	10	11	12	13
REVENUES	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
kWh/yr [1]	2,995,920	2,995,920	2,995,920	2,995,920	2,995,920	2,995,920	2,995,920	2,995,920	2,995,920	2,995,920	2,965,961	2,936,301	2,906,938
PPA Rate ($/kWh)	0.0550	0.0561	0.0572	0.0584	0.0595	0.0607	0.0619	0.0632	0.0644	0.0657	0.0670	0.0684	0.0698
Electric Revenue	164,776	168,071	171,433	174,861	178,358	181,926	185,564	189,275	193,061	196,922	198,852	200,801	202,769
	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Earnings-Annual	**164,776**	**168,071**	**171,433**	**174,861**	**178,358**	**181,926**	**185,564**	**189,275**	**193,061**	**196,922**	**198,852**	**200,801**	**202,769**
EXPENSES- Per Turbine													
Operation/Maintenance - Local [2]		0	0	0	0	0	0	0	0	0	0	0	0
Operation/Maintenance - Factory [2]	15,000	15,300	15,606	15,918	16,236	16,561	16,892	17,230	17,575	17,926	18,285	18,651	19,024
Extended Warranty		14000	14000	14000	14000								
Electrical Usage	500	510	520	531	541	552	563	574	586	598	609	622	634
Insurance [3]	9,000	9,180	9,364	9,551	9,742	9,937	10,135	10,338	10,545	10,756	10,971	11,190	11,414
Property Tax [3]	2,160	2,203	2,247	2,292	2,338	2,385	2,433	2,481	2,531	2,581	2,581	2,581	2,581
Leaseholder Payments	0	0	0	0	0	0	0	0	0	0	0	0	0
Repairs Reserve	18,000	18,360	18,727	19,102	19,484	19,873	20,271	20,676	21,090	21,512	21,942	22,381	22,828
Total Per Turbine - Annual	44,660	59,553	60,464	61,394	62,341	49,308	50,294	51,300	52,326	53,373	54,389	55,425	56,482
Total Expenses - Annual	133,980	178,660	181,393	184,181	187,024	147,925	150,883	153,901	156,979	160,119	163,166	166,274	169,445
Debt Service Payment	139,330	139,330	139,330	139,330	139,330	139,330	139,330	139,330	139,330	139,330			
Total Operating Expenses	273,310	317,990	320,723	323,511	326,354	287,255	290,213	293,231	296,309	299,449	163,166	166,274	169,445
Net Cash(per Annual Cash Reserve)	-108,535	-149,919	-149,290	-148,650	-147,996	-105,329	-104,649	-103,956	-103,248	-102,527	35,686	34,526	33,323
COVERAGE													
Accumulating Net Reserve	-108,535	-260,624	-415,127	-572,079	-731,517	-851,476	-973,155	-1,096,574	-1,221,754	-1,348,715	-1,340,004	-1,332,278	-1,325,600
EQUITY PROVIDER AFTER TAX BASIS													
Federal PTC Value	0	0	0	0	0	0	0	0	0	0			
Depreciation Value (35%)	311,921	499,074	299,444	179,667	179,667	89,833	0	0	0	0			
Income Tax	?	?	?	?	?	?	?	?	?	?			
Total Tax Value	**311,921**	**499,074**	**299,444**	**179,667**	**179,667**	**89,833**	**0**	**0**	**0**	**0**			
After Tax Return	**203,387**	**349,155**	**150,154**	**31,017**	**31,671**	**(15,496)**	**(104,649)**	**(103,956)**	**(103,248)**	**(102,527)**	**35,686**	**34,526**	**33,323**

Notes:

1 Decreases 1% per annum beginning year 11

2 Increases 2% per annum beginning year 2

3 Increases 2% per annum beginning year 2- simplified tax amount shown, will decline in later years

Project Proforma

14	15	16	17	18	19	20
2023	2024	2025	2026	2027	2028	2029
2,877,869	2,849,090	2,820,599	2,792,393	2,764,469	2,736,825	2,709,456
0.0711	0.0726	0.0740	0.0755	0.0770	0.0786	0.0801
204,756	206,762	208,789	210,835	212,901	214,987	217,094
0	0	0	0	0	0	0
204,756	**206,762**	**208,789**	**210,835**	**212,901**	**214,987**	**217,094**
0	0	0	0	0	0	0
19,404	19,792	20,188	20,592	21,004	21,424	21,852
647	660	673	686	700	714	728
11,642	11,875	12,113	12,355	12,602	12,854	13,111
2,581	2,581	2,581	2,581	2,581	2,581	2,581
0	0	0	0	0	0	0
23,285	23,751	24,226	24,710	25,204	25,708	26,223
57,560	58,659	59,781	60,925	62,092	63,282	64,496
172,679	175,978	179,342	182,774	186,275	189,846	193,488
172,679	175,978	179,342	182,774	186,275	189,846	193,488
32,077	30,785	29,446	28,060	26,626	25,142	23,607
−1,320,035	−1,315,651	−1,312,518	−1,310,708	−1,310,296	−1,311,361	−1,313,981
32,077	**30,785**	**29,446**	**28,060**	**26,626**	**25,142**	**23,607**

Notes:

1 Decreases 1% per annum beginning year 11

2 Increases 2% per annum beginning year 2

3 Increases 2% per annum beginning year 2- simplified tax amount shown, will decline in later years

Federal Bonus Depreciation as Applied to MACRS-GDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Basis		4,437,000						
First Year BonusDeprec.	0%	0						
Reduced Basis		4,437,000	4,437,000	4,437,000	4,437,000	4,437,000	4,437,000	
Year 1 -- MACRS	20%	887,400						
Year 2 -- MACRS	32%		1,419,840					
Year 3 -- MACRS	19.2%			851,904				
Year 4 -- MACRS	11.52%				511,142			
Year 5 -- MACRS	11.52%					511,142		
Year 6 -- MACRS	5.76%						255,571	
Total Depreciation		887,400	1,419,840	851,904	511,142	511,142	255,571	**4,437,000**
								1,996,650

Internal Rate of Return -ten year

	Initial Cash		**$**	**2,154,000**	
	Years			**10**	

Yr. No.	Year	Cash out		Cash	IRR
1	2010	2,154,000	$	(2,154,000)	-
1	2010	-		203,387	
2	2011	-		349,155	
3	2012	-		150,154	
4	2013	-		31,017	
5	2014	-	$	31,671	
6	2015	-	$	(15,496)	-
7	2016	-	$	(104,649)	-
8	2017	-	$	(103,956)	-
9	2018		$	(103,248)	
10	2019		$	(102,527)	
			$	**335,507**	

Internal Rate of Return - 20 year

	Initial Cash		**$**	**2,154,000**	
	Years			**10**	

Yr. No.	Year	Cash out		Cash	IRR
1	2010	2,154,000	$	(2,154,000)	-
1	2010	-		203,387	
2	2011	-		349,155	
3	2012	-		150,154	
4	2013	-		31,017	
5	2014	-		31,671	
6	2015	-		(15,496)	-
7	2016	-		(104,649)	-
8	2017	-		(103,956)	-
9	2018			(103,248)	
10	2019			(102,527)	
11	2020			35,686	
12	2021			34,526	
13	2022			33,323	
14	2023			32,077	
15	2024			30,785	
16	2025			29,446	
17	2026			28,060	
18	2027			26,626	
19	2028			25,142	
20	2029			23,607	
			$	**634,784**	

Appendix B

Turbine Information

ELECON - TURBOWINDS
DESIGN AND SUPPLY OF T600

TECHNICAL DATA

Table of Contents

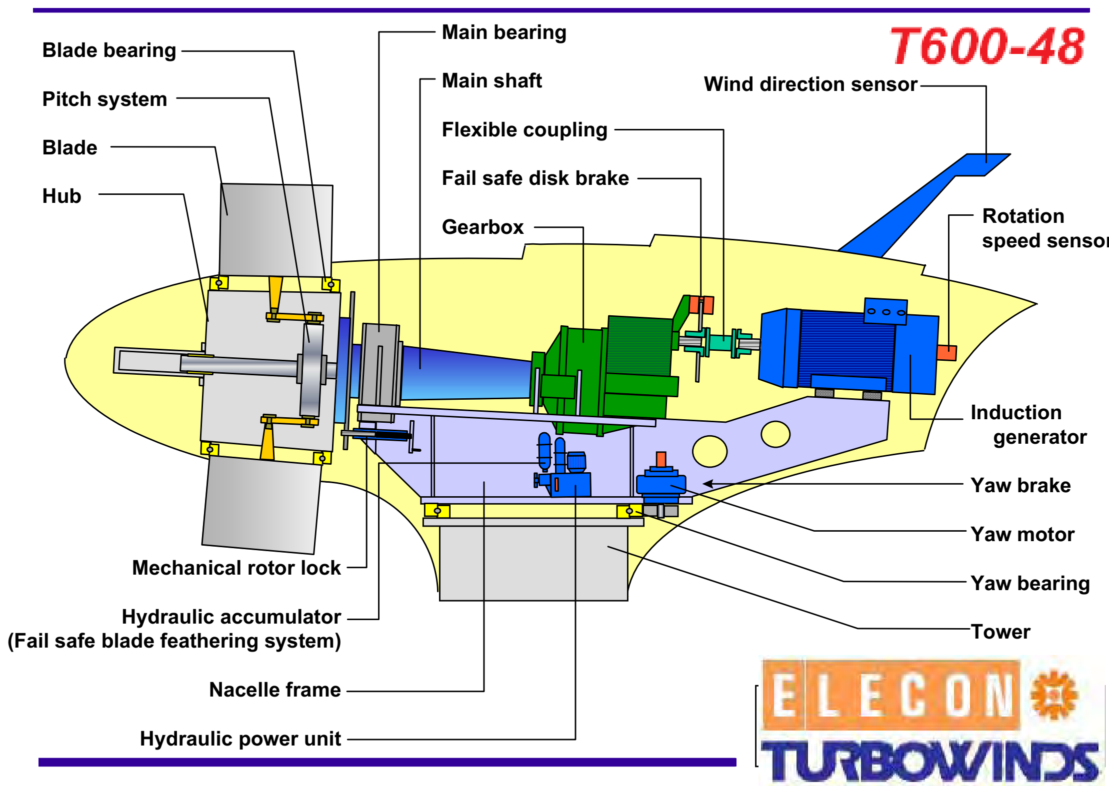
1 GENERAL DESCRIPTION

The T600 is designed to allow wind turbine generators to function automatically on an unmanned basis. Depending upon wind conditions, this includes automatically starting, normal generator operation, automatically stopping and in abnormal circumstances automatic trip/lockout.

The WTG is a horizontal axis wind turbine with an upwind rotor.
The size of the T600 is 600 kW with a rotor diameter of 48 m.

The generator offered is a dual speed generator, 600/120 kW.

The blade pitch control is ACTIVE STALL.



1.1 Standards

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 61400-1 Wind turbine generator systems

TECHNICAL DATA

TECHNICAL INFORMATION	T600-48 TURBOWINDS
1 **Wind Turbine**	
Manufacturer	**ELECON - TURBOWINDS N.V.**
Type and Model number	**T600-48 DS**
Rated power, kW	**120 / 600 kWatt (dual speed)**
Wind speed at hub height:	
Cut-in, m/s	**3.5 m/sec**
Rated, m/s	**12.5 m/sec**
Cut-out, m/s	**25 m/sec**
Maximum designed (survival), m/s	**60 m/sec**
Rotor diameter	**48 m**
Hub height	**50 m**
Method of control	**full blade pitch active stall**
System design life for all components, yr	**20 years**
Approval / type - certification Quality control system certification Power curve certification	**C-WET** **ELECON** **CIWI Holland**
2 **Rotor**	
Number of blades	**3**
Diameter, m	**48 m**
Speed, rpm	**15.3 / 23 rpm**
Swept area	**1809 m²**
Direction of rotation (looking upwind)	**clock-wise**
Location relative to tower	**upwind**
Type of Hub	**Rigid**
Tilt angle	**4 degrees**
Cone angle	**-2 degrees**
Method of speed control	**pitch regulation + active stall**
3 **Blade**	

Manufacturer	**LM**
Type and model	**23.3P**
Length, m	**23.2 m**
Material	**Fibre glass**
Weight, kg/blade	**2300 kg**
Blade bearing diameter (internal/external), m	**1.25 m / 1.46 m**
4 <u>Drive Train</u> Shaft speeds:	
Low speed, rpm	**15.3 / 23 rpm**
High speed, rpm	**1200 /1800 rpm**
Main shaft :	
Material	**34CrNiMo6**
Length and diameter	**2.05m - 0.48m**
Bearings	**SKF**
Gear Box:	
Manufacturer and type	**ELECON / Flender , planetary-parallel**
Ratio	**78.26**
Rating, kW	**600 kW**
Service factor	**1.3**
Efficiency (at rated power conditions)	**96 %**
Lubrication	**splash**
Bearings	**SKF**
dba at 1 meter distance	**80 dba**
Brake:	
Manufacturer and type	**SIME**
Location, HSS/LSS	**HSS**
Flexible coupling :	
Manufacturer and type	**ELECON/ Flender GKG**
5 <u>Yaw Drive</u> Manufacturer and type	
Yaw rate, deg/sec	**0.5 deg r/sec**
Yaw error dead band	**5 degrees**
Yaw drive (electric/hydraulic)	**Hydraulically**
Yaw brake	**Hydraulically yaw brakes**
Turntable	**ball bearings**
Pressure	**180 bar**
Moment , Nm	**23.8 kNm**
6 <u>Pitch Drive</u>	

Manufacturer and type	**Parker or Equivalent**
Pitch rate, Deg./sec.	**4.6 deg/sec**
Pitch mechanism, electric/hydraulic	**Hydraulically**
Pressure	**225 bar**
Cylinder force ,kN	**250 kN**
Feathering system (including backup)	**Hydraulically**
	T600-48 TURBOWINDS
7 Tower Type and Material	**ST 42**
Height, m	**50 m**
Diameter and Thickness at top, cm	**209.4 cm - 1.2 cm**
Diameter and Thickness at base, cm	**314.0 cm - 2.5 cm**
Tower Layout	**cylindrical – tapered**
First bending frequency , Hz	**0.9 Hz**
Access to nacelle	**inside tower**
Corrosion prevention	**3 coat painting**
Withstanding seismic loads	**0.35 g**
8 Power Generation System **Generator:**	
Manufacturer	**ABB / Siemens**
Type and Model number	**M2CG 400 XL 4/6**
Rating, kW	**120/ 600 kW**
Rated current	**123/566 Amp**
Slip	**0.7 % / 0.9 %**
Power Factor (100%-75%-50%-25%)	**0.89 - 0.88 - 0.85 - 0.68**
Voltage, V	**690 VAC**
Frequency, Hz	**60Hz**
Speed, rpm	**1200/1800 rpm**
Insulation	**class F**
Maximum working temperature, C	**45 degrees ambient temp**
Efficiency (100%-75%-50%-25%)	**96.9 % - 96.7 % - 96.2 % - 94.1% respectively**
Winding protection type	**IP 55**
Safety device	**3 PTC's per generator**
dBA at 1 meter distance	**< 85 dBA**
Connection to grid, direct/soft	**soft started**
Electricals:	**T600-48 TURBOWINDS**
Reactive power compensation &APFC	**50/150 kVar ,& 175KVAR,**

	8 steps
Net power factor after compensation (100-75-50-25 %)	**0.97 - 0.99 - 0.99 - 1**
Grid control	**Voltage-Current-Asymmetry**
Power control	**active power transducer**
Main supply	**690 VAC**
Protection	**Power varistors**
Contactor/light supply	**110VAC/220VAC**
Control system supply	**24VAC-> 24 VDC + batteries**
Independent over speed control	**master and back-up brake**
9 <u>Control System</u>	**T600-48 TURBOWINDS**
Manufacturer	**Turbowinds**
Type of supervisory	**microprocessor INTEL**
digital inputs	**48 inputs (opto-isloated)**
digital outputs	**48 outputs (opto-isolated)**
analog inputs	**16 analog inputs (10 bits)**
analog outputs	**4 analog outputs (8 bits)**
synoptical panel	**96 colour leds , LCD display**
remote control	**RS232 full remote control**
battery back-up	**2 months**
lightning protection	**transorbs**
10 <u>Turbine controls</u>	
Software	**Turbowinds (assembler)**
Power	**full blade pitch - active stall**
Software controls	
Over speed rpm’s	**1823 rpm’s , 1890 rpm’s**
voltage	**10 %**
frequency	**1 Hz**
asymmetry	**5 %**
Wind speed	**3.4 m/sec - 25 m/sec**
Hardware controls	
Over speed relay rpm’s (in controller)	**1920 rpm’s**
Over speed brake rpm’s (independent , fail safe)	**1950 rpm’s**
11 <u>Weights (in kg.)</u>	
Wind turbine total (excluding tower)	**35.000 kg**
Tower (50 m)	**54,000 kg**
Rotor (including blades)	**12.000 kg**
Above tower (including rotor)	**35.000 kg**

Gear Box	**4.500 kg**
Generator	**3.100 kg**
Heaviest piece to be handled during erection	**tower and nacelle**

2 MECHANICAL

2.1 Rotor

The rotor assembly consists of the blades and hub including the connection of the blades to the hub. The blades are connected to the hub through a bearing connection allowing the blades to be rotated during operation. The rotor will be self-starting.

a) Blades

The blades are fibreglass and manufactured in materials, which do not create any interference to television or FM radio reception.

The blades are of a standard and proven type.

The blades are designed for low aerodynamic noise generation.

The blades have a matt finish with adequate abrasion resistance to prevent appreciable degradation in performance between specified maintenance periods.

Adequate drainage is provided to prevent condensation build-up in the blades.

All blades have an identification plate which shows the year of fabrication, serial number, weight and the number (s) of the other blade (s) forming a set of blades.

(b) Hub

The design of cast hubs in general is in accordance with the appropriate national standards for cast iron .

(c) Rotor Locks

To enable maintenance to be carried out safely on the rotors, means of locking the turbine rotor shaft in the stationary position is provided.

(d) Failsafe

Pitch regulation is failsafe so that in the event of loss of control blades will return to the feather position.

2.2 Braking System

Two independent braking systems are included. Both systems are independent and fail-safe. The maximum over speed does not endanger the machine.

Braking systems are capable of being tested regularly in a manner, which does not endanger the WTG in the event of a failure.

Under normal operational conditions the braking system is be capable of bringing the rotor to idling speed and eventually to a complete stop where this is required.

The braking system is operable from the nacelle as well as from the tower base control board.

a) Hydraulic System

Provisions are included to prevent over pressure in the system.

The hydraulic system does not operate when the machine is idle unless manually operated for maintenance purposes. If the pressure falls or leaks occur in the system the WTG will be stopped.

b) Pressure Components

All pressure vessels, pipes, valves and other components, which will be subject to pressure, will be subjected to hydraulic pressure tests in the works. The test pressures will be 1.5 the maximum working pressure and will be applied for 30 minutes.

2.3 Nacelle

The turbine unit includes a nacelle to house and support the rotating machinery in board of the rotor hub and to given protection to control and instrumentation equipment that needs to be located at this level. The nacelle is fully enclosed against the elements with a robust weatherproof corrosion resistant housing for all the generating equipment. It provides sufficient access and natural light for one operator to be able to inspect all components and carry out routine maintenance e.g. oil change, greasing or brake adjustments. It is constructed in such a manner as to provide a safe working area with regard to the height above ground and the close proximity to rotating components.

There is sufficient room inside the nacelle to carry out normal maintenance on the equipment inside.

Observation of the turbine blades and hubs is possible from the nacelle. The equipment such as anemometers and wind vanes and lightning conductors are fitted on the roof of the nacelle, access to the roof is provided. Access is also provided to the external parts of the rotor. Attachment points are provided for harnesses when staff is working in exposed positions. The nacelle provides adequate noise isolation and insulation to ensure that levels of noise at ground level meet guaranteed levels.

2.4 Yawing System

A yaw system is provided to enable the turbine to face into the wind when it is operational. Each wind turbine generator has its own yaw sensor.

The yaw system automatically untwists the power cables after a specified number of turns have been experienced (one turn when not connected parallel with the grid while two turns when connected to the grid).

A mechanical locking device is provided to prevent yawing of the nacelle when maintenance is being carried out on the yaw motors and brakes.

2.5 Power Transmission

a) Main Shaft

The main shaft is designed for all relevant load conditions including extreme and fatigue loading and the material used is ductile.

b) Shafts and Couplings

Turbo winds supplies suitable shafts and couplings for supporting and connecting the main rotating components. They are designed for the maximum torque loading that can be transmitted with appropriate allowance for the continuous variation in torque, braking loads and frequency of starts and stops and loads due to generator short circuits.
Couplings are capable of accommodating the maximum misalignments and axial displacements which are expected.

c) Gear box

The gear box is of adequate strength to meet all loads imposed on them. In addition to those during normal operation these will include loads due to braking, both normal and emergency, generator short circuits and starting. They will not suffer any damage during overs peed following the operation of the over speed trip devices. The design, manufacture and installation of the gearboxes is such that the external noise arising from them is kept to a minimum.
An oil temperature gauge is fitted on each gearbox. Filler and drain plugs are provided.
The oil is cooled by external oil cooler when a certain oil temperature level is reached.

d) Guards

All rotating and moving components including couplings will be enclosed or guarded so that it is not possible for operators to come into contact with them when the machinery is moving or when there is any risk of it moving. Where the guards are in the form of doors, locks will be provided.

2.6 Bearings

All bearings supplied are designed for the life of the plant.

3 GENERATOR

The double speed generator is a 3-phase medium voltage induction type. The generator has a soft start system (patented soft resistor system) to avoid excessive inrush current during starting.

The generator supplied is of standard design. It is capable of operating with high reliability under all operating conditions with due allowance for the variable output imposed by the fluctuations in wind speed. It is capable of handling load rejection and other system faults including the maximum over speed that it can reach on operation of the over speed trips

The generator is connected to the grid by a “patented” soft start system to ensure a gentle increase of the current. The starting device will ensure a soft start whether the WTG is started manually or by the control system. The starting device is short circuited when the generator has been connected to the grid.

The generator is designed to avoid the build up of condensation in the windings by the use of anti-condensation heaters.

In considering the design of the generator cooling air fan Turbo winds ensures that this complies with noise limitations.

The bearings can be efficiently lubricated at all running speeds. Provision is made for preventing lubricant from gaining access to the windings or other current carrying parts.

The generator will be capable of withstanding the maximum overload conditions for the maximum conceivable duration.

The generator is constructed to withstand direct connection at synchronous speed to the grid.

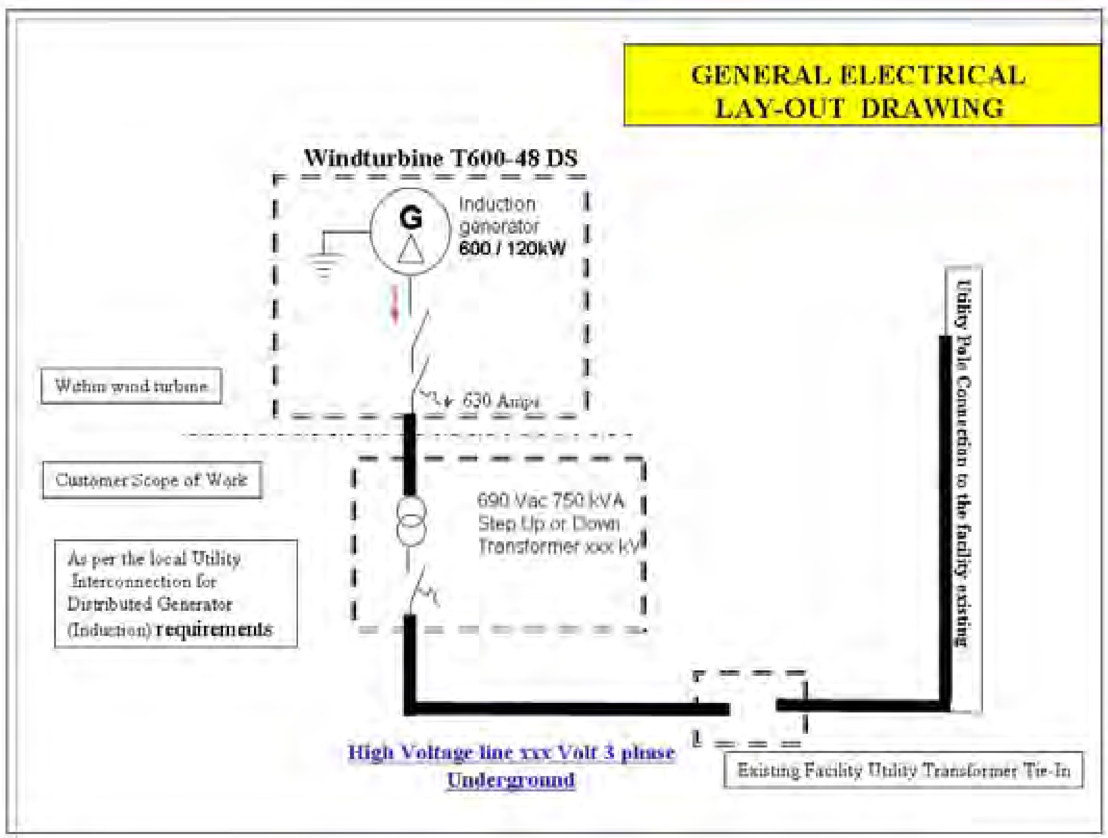
The generator is provided with temperature sensors incorporated in the stator windings for temperature protection.

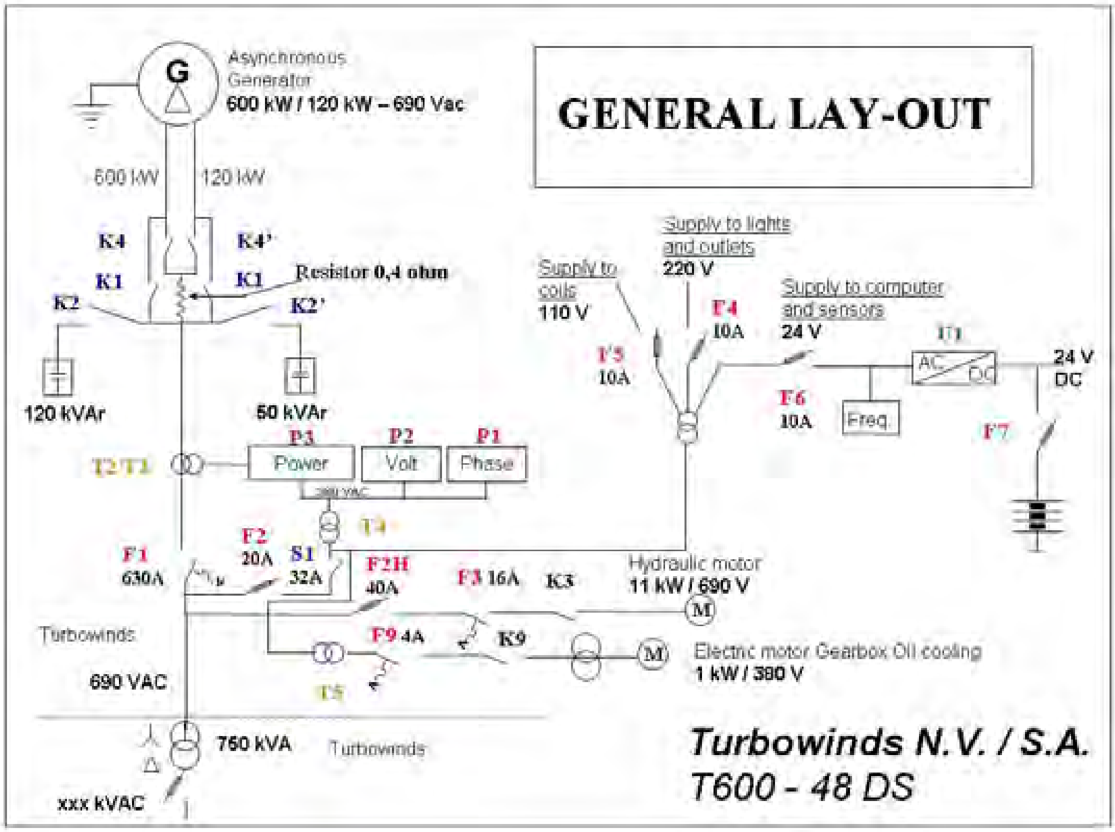
4 ELECTRICAL

The electrical installation is designed for continuous operation under the specified Site climatic conditions. Circuits with different voltages will be segregated .

Due to high humidity conditions anti-condensation heaters are needed where necessary.

Single line diagram :





Main Electrical Component Manufacturers

Main Circuit Breakers:
F1: Main Circuit Breaker (Klockner-Moeller) – UL 489 / CSA 22.2 no. 5,1
F4/F5/F6/F7 Circuit Breakers (ABB) – UL listed
K1/K2/K3/K4: Contactors – ABB – UL listed
Capacitor Bank Units – ABB
CLMD 83 690/50-120 (120 kvar)
CLMD 63 690/50-50 (50 kvar)

Reactive power compensation Schemes

For 600 KW generator the power factor at full load is 0.89 without power factor correction. Therefore reactive power consumed is approx. 307 kVAR. Switching on both capacitors banks of 170 kvar (120+50), the power factor will be 0.975

For 120 KW generator the power factor at full load is 0.82 without power factor correction. Therefore reactive power consumed is approx. 83 kVAR.

Switching on one small capacitor banks of 50 kvar, the power factor will be 0.96

4.1 Circuit Protection

Each generator has separate short-circuit protection and overload protection on all phases.

The protective devices are rated for making/breaking the maximum short-circuit current which can occur at the point of installation where it is used.

Contactors applied for connection of the generator to the gird have a breaking capacity larger than the direct on line starting current for the generator when operating as a motor.

Hydraulic pumps, yaw motor and power supplies for control circuits, have individual protection against short circuits and overload.

Over current relays are adjustable at least within the range 90-110% of the rated full load current.

4.2 Protection Requirements

The protection system for each generator should include the following:

1. Negative Phase Sequence (NPS) protection
2. Frequency
3. Over current
4. Over voltage

4.3 Capacitor Banks

Capacitor banks & APFC panel are provided to ensure that the power factor is almost unity.

The cut-in and cut-out of the banks will be automatically controlled by separate contactors.

The capacitors will be of the metallised film type, and correspond to the rated voltage and frequency.

The capacitors are provided with a means of draining the stored charge and of preventing charge build up during maintenance work.

The capacitor bank is enclosed so that persons cannot come in to accidental contact or bring conducting material into accidental contact with exposed energised parts, terminals or buses associated with them.

The enclosure and capacitor cases will be earthed for protection.

4.4 Power Transformers (For reference only)

Turbowinds recommends use of step up or step down transformer of 750 kVA from 690 V to the facility service voltage for interconnection of wind turbine generator as per the local utility requirements.

Transformers shall be located at out door on the plinth with well equipped 2 pole DP structure.

The transformers are required to design set up with off load tap changing facilities on the high voltage side with a minimum range of +5 % to –5 % in 2.5 % steps and suitable transformer impedance for the duty. Tap changers will be manually operated. Indication of tap position is clearly visible from ground level.

The transformer is accessible only to authorised personnel.

4.5 Earthing (For reference only)

The WTG earthing grid is designed for adequate dissipation capacity from earth current under the most severe conditions in high earth fault current concentration areas; grid spacing will be sufficient for maintaining voltage gradients.

A terminal bar for equipment earthing is provided and secured inside each enclosure for the attachment of the earth conductor and all the internal/external earth conductors.

The terminal bar is bonded to the cabinet and to all non current conducting parts.

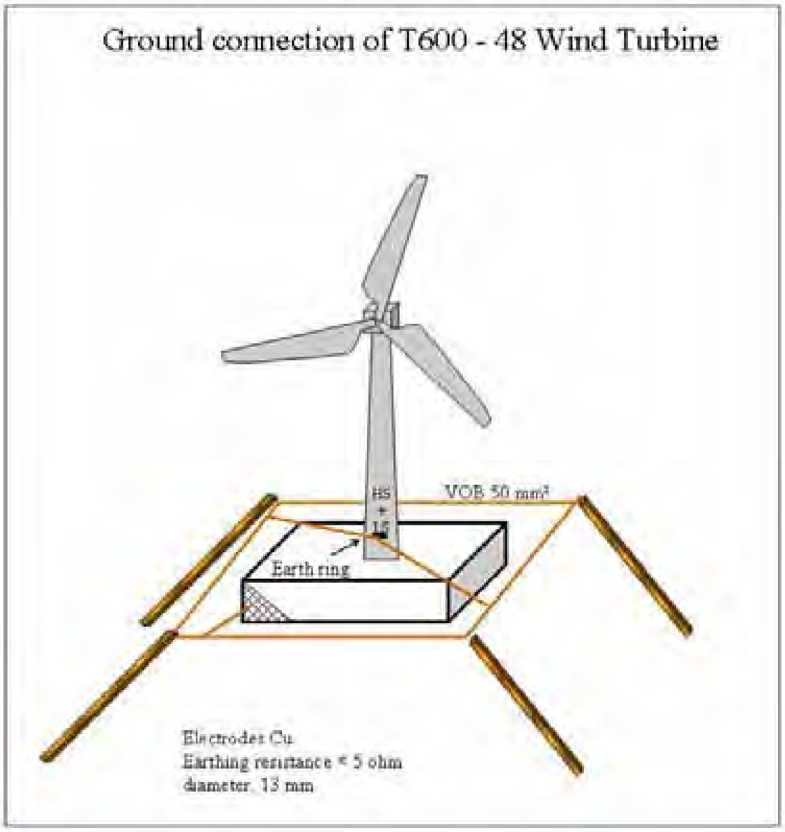
Bonding is provided where necessary to assure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.

A bonding jumper is a wire, bus, screw or similar suitable conductor.

All metal parts are bonded to earth using a stranded copper conductor of minimum size 1.5 mm^2. All earth screws will be high strength bronze.

An earthing grid using a ring conductor with earthing rods with a minimum diameter of 13 mm will be installed to give a maximum resistance of 10 ohm at each WTG or to the requirements of local regulations. The materials used will be compatible with the existing environmental conditions. The resistance will be confirmed by means of primary injection testing prior to commissioning.

All above ground earth cables will be insulated.



4.6 Interconnection (For reference only)

The interconnection between wind turbines and step up transformers is an underground cabling system will be as per the local code requirements and utility interconnection requirements for Induction generators.

4.7 Tower Facilities

One standard 10A 220V general-purpose single phase electric outlet is installed in the base of the tower, in close proximity to the main internal light switch. The main internal light switch operates all lights within the tower. Lights are installed to provide adequate lighting in all areas within the wind turbine tower, at the base and at the top.

One standard 10A 220V general-purpose single-phase electric outlet is provided in the nacelle.

5 CONTROLS & INSTRUMENTATION

5.1 Control Principles and Scope

The control system is designed for safe and efficient operation, control and monitoring of the wind farm and individual WTGs based on an automatic, unattended operation using microprocessor systems.

Turbowinds offers proven equipment, of which Turbowinds can demonstrate satisfactory experience.

Components sensitive to extreme temperatures and/or high humidity are protected against these conditions to insure reliable operation.

The control system is self-monitoring such that a safe shutdown occurs in the case of a control system malfunction.

The control system is readily expandable to allow for future additions and modifications.

There is no possibility of self-excitation of any wind turbine due to transmission line capacitance.

<u>Optional :</u>
The control system provides a central monitoring and control system for the Wind Farm with individual local controllers at each WTG. These systems will include:

(a) Information for the operator, both locally and remotely, to be able to quickly identify faults and initiate remedial action.

(b) A comprehensive log of historical and real time information to monitor specific plant condition.

(c) Modem and interface cards to interface for remote access.

(d) a personnel pager interface and auto dialler whereby any alarm from the Wind Farm (in the unattended model) activates a selected pager alerting operations personnel to the alarm type.

(e) an Uninterruptible Power Supply (UPS).

(f) The software is developed using a standard programming language.

5.2 Wind Turbine Generator Controller

The following commands are included as a minimum for each WTG:

- Reset WTG

- Stop WTG – normal and emergency
- Start yawing right or left
- Stop yawing
- Start WTG
- Change control limits

Adequate provision is made for interlocks to prevent unsafe operation of the WTG while site personnel are working on them.

The WTG manufacturer's standard instrumentation for unattended, automatic operation is acceptable consistent with it including the minimum instrumentation required to carry out all service and set up functions required by the service manuals and the grid connection authority.

The control panel is provided with a display, to present the data and status of the WTG.

The computer system monitors and displays the following parameters for the WTG:

- Voltage (V), in rms values
- Frequency (Hz)
- Generator revolution speed (rpm)
- Actual active power production (kW)
- Accumulated energy for each WTG (kWh)
- Operation hours for each WTG (h)
- Entry alarms
- Type of fault and time for shut down (error code, month, day, hour and minute)
- Status of each Generator
- Yaw system position
- Wind speed and direction
- Trending graphs for above data

Display lay outs:

Screen 1:

RPM	BLADE	Yaw	kWsec	Mast	wind	Freq
1808	235	30046	602G	15.5	15.2	60.1 Hz

RPM's: are measured 1 rpm accurate and each 100 msec.
BLADE: blade position, measured by analog input and each 50 msec.
Yaw: yaw position, 0.05 degrees accurate and measured each 100 msec.
KWsec.: kWatt last second, 0.5 kW accurate and measured each 50 msec.
Mast: this is the windspeed sent by central datacomm computer (if available) and measured from a central windspeed mast.
Wind: this is the windspeed from the windspeed meter mounted at the back of the nacelle (1 second average).
Freq.: grid frequency, 0.1 Hz accurate and measured each 1 msec.

Screen 2:

RPMmax	RPMmin	Windmin	Volt	position
1815	1798	15.1	692	3 - 20

RPMmax: maximum rpm which has been measured while connected.
RPMmin: minimum rpm which has been measured while connected.
Windmin: this is the windspeed from the windspeed meter mounted at the back of the nacelle (1 minute average).
Volt: voltage from the grid between lines 1 and 3 measured each 100 msec and 1 Vac accurate.
position: this indicates if the windturbine is in idling mode (1), measuring mode (2), climb up mode (3) or in connected mode (4). Together with the position mode, the timer countdown is shown in seconds.

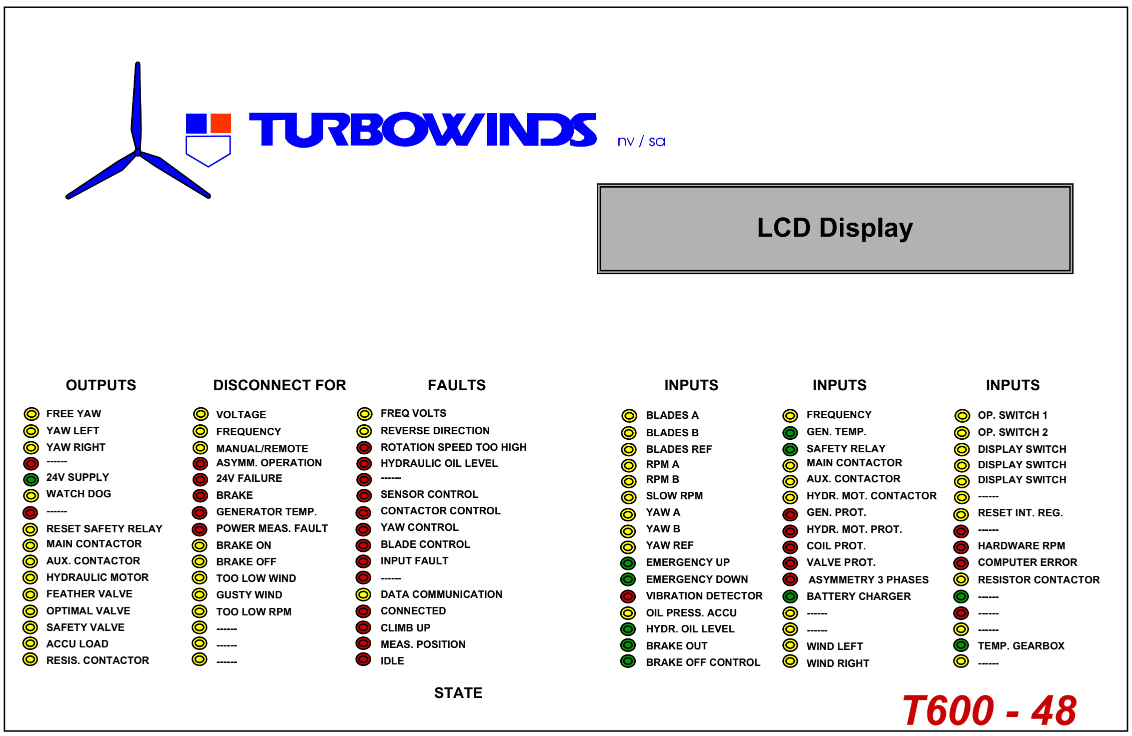
Screen 3:

kWmin	kWhour	kWhmot	Produced	Operated
602G	595G	00014	1820M872k	07613h46

kWmin: kWatt produced during last minute.
kWhour: kWatt produced during last hour.
kWhmot: kWh consumed by the windturbine due to low winds.
Produced: total produced MWh and kWh since beginning of power production.
Operated: total hours and minutes connected to the grid.

Screen 4 to 8 :

See chapter 8 for a complete list of possible display messages on these screens.



6 TOWER

The wind generator support structure is a single tubular steel column with a neat and visually unobtrusive appearance designed fabricated and erected in accordance with Standard Technical Specification for Structural Steelwork.

Safe and sufficient access to the nacelle will be provided directly from the tower using an internal ladder. Tower access and cabling will be designed to avoid interference and ensure safe conditions.

A platform is provided close to the top of the tower at an adequate height for safe and easy inspection of the yaw arrangement and for access to the nacelle.

An inspection platform is also included below each tower section assembly in the case where bolted joints are used.

The internal access does not interfere with any cables, which may hang down the tower.

A floor is foreseen at the base of tower at an adequate height to ensure easy access to and readout from the controller unit.

The tower is designed to avoid critical resonances at the normal rotational speed of the wind turbine and to ensure the necessary safety against dynamic and extreme loads. The tower is designed to withstand all possible load cases.

Where bolted flange connections are used for tower section assembly adequate protection will be applied before assembling to ensure full resistance against intrusion of water and moisture.

Attachment D-3c
Libman Company Feasibility Study for 1.5 MW Wind Energy System (June 2010)

FEASIBILITY STUDY

Of A 1.5 MW Wind Energy System for

Libman Wind Turbine Company, LLC

Arcola, Illinois

Prepared For:

The Libman Company

220 N. Sheldon

Arcola, IL 61910

Prepared and Submitted by:

GDS Associates, Inc.
Engineers and Consultants

June 2010

GDS Associates, Inc. • 440 Science Dr. • Suite 400 • Madison, WI 53711 • **www.gdsassociates.com**

Marietta, GA • Austin, TX • Auburn, AL • Manchester, NH • Madison, WI

TABLE OF CONTENTS

1. Executive Summary

GDS Associates, Inc. was contracted by the Libman Company to conduct a feasibility study as an independent, qualified third party for the Libman Wind Turbine Company, LLC USDA REAP Grant application, because the proposed renewable energy system project has a total eligible cost in excess of $200,000. The Libman Wind Turbine Company, LLC qualifies for the USDA REAP program as a rural small business as a company with less than 500 employees in a town with less than 50,000 residents. GDS Associates, Inc. (GDS) is a multi-service energy consulting firm with an extensive history of services for the energy efficiency and renewable energy industries.

The proposed project involves the installation of a single Vensys 77 wind turbine, rated at 1.5 MW. The owner of the Libman Wind Turbine Company is Aaron Libman, a successful businessman involved with the Libman Company, which is hosting the turbine at their facility in Arcola, Illinois. The wind turbine selected for the project is made by Vensys, a well respected German wind turbine manufacturer. Located in Arcola, Illinois, the project will take advantage of the prairie winds that blow through the area. Indeed, a number of wind farms are located in the area, indicating a good quality wind resource. The project supports community and local business goals to develop a broader economic engine based on green energy technology. The wind turbine itself will be a highly visible example of the potential for community based wind energy development using high quality utility scale wind turbines.

This feasibility study has been prepared in accordance with USDA RD Instruction 4280-B, requirements for renewable energy system projects with total eligible costs greater than $200,000 and addresses the economic, market, technical, financial and management feasibility of the proposed project. Key findings from the study are summarized below:

> **Economic Feasibility**: The project provides significant benefit to both the community and the environment. The site is well suited for the installation of the single wind turbine and the production of electricity from a renewable energy source is expected to reduce greenhouse gas emissions by approximately 3,392.1 metric tons of carbon dioxide equivalent annually. The wind energy project offers a strong regional vision for future job growth in renewable energy developments.
>
> **Market Feasibility**: Electricity generated from the wind energy system is the main product of the turbines. The market value of the electricity is based on the sale of the electricity to the Libman Company, with any additional energy priced at the standard QF rate offered by the host utility. The QF rate will require a PPA, for which negotiations and contracts are standard and have been started. The project does have an ability to bring the electricity to market, leveraging the existing electrical infrastructure at the Libman Company's facility.
>
> **Technical Feasibility:** The proposed project is technically feasible. The wind resource has been carefully modeled and the singe wind turbine can be expected to produce electricity as modeled. The project maintains financial viability under several scenarios using standard wind industry financial risk modeling.

Financial Feasibility: The Libman Wind Turbine Company wind project is financially feasible. Simple payback is achieved in 9.9 years. Financing available and the project has been awarded funding from the Illinois Department of Commerce and Economic Opportunity. The PPA levels are realistic and conservative. Good financial risk management is being taken by the Libman Wind Turbine Company, which ensures that there is little likelihood of currency risk, not meeting cash flow, debt obligations, or maintenance needs.

Management Feasibility: Administrative management will be handled by the Libman Wind Turbine Company, LLC. Aaron Libman, the owner, has extensive experience operating a much more complex industrial company, making the wind turbine management a relatively simple task. The Libman Wind Turbine Company will ensure that operations and maintenance expectations are maintained. Actual construction, as well as direct operations and maintenance services, will be provided by experience contractors with a strong history of project success in the wind industry. The project is feasible from the management perspective.

2. Economic Feasibility

Site Considerations

The proposed site is controlled by Libman Equipment Co. which is leasing the site to Libman Wind Turbine Co. The turbine location is proposed to provide maximum distance from neighbors, while still meeting local ordinances. The City has a wind ordinance that specifies a 1000' setback from residences and 1.1X total turbine height from property lines and roads. An Easement is being obtained from the landowner with the farm field to the North to allow the turbine to be sited closer than 1.1X total height. These setbacks are similar to what have been used at numerous wind projects throughout the Midwest, 1000 feet from homes will assure sound levels will be below 45dB at all times. A shadow flicker map has been provided and shows that no residence will exceed 30 real hours of shadow flicker.

The surrounding topography is relatively flat and there are no expected impacts.

The interconnection point is nearby at the Libman Company building. There is sufficient room for the metering and switchgear.

The construction site is open. There is sufficient space for lay down area and crane placement.

Community Impacts

The community impacts of a turbine located at the Libman Company will be generally positive. Many turbines developed in the manner of the Libman Wind Turbine Company project become "adopted" by the host communities. The turbines are viewed as an economic asset and become a visible symbol of a community moving toward greater environmental sustainability.

Turbine projects also become an educational asset for the community. The presence of a turbine becomes a tangible teaching tool to enhance science, math, economic, and other subjects in a community. The Libman project can function in much the same manner.

In the immediate surroundings, the turbine may have some impact on neighboring properties. Such impacts could include shadow flicker and minor increases in ambient sound. The placement of the Libman turbine minimizes these impacts and the project engineer has presented the shadow flicker and sound impacts of the projects. The sound impact has been shown to be minimal, while the shadow flicker will only impact nearby properties for small percentages of the year. For those that feel the impact is strong enough, simple and inexpensive mitigation efforts can be deployed to address specific properties. Generally speaking, shadow flicker can be an annoyance if the impact will be 40 hours per year or more.

Availability of Labor

Wavewind, the contractor for construction, has an experienced crew to manage construction and complete technical components for wind turbine installation. Vensys, the manufacturer, will complete the tower erection and turbine installation.

The remaining work to be completed is within normal scope of work for typical specialized contractors. The contractor work will have to be overseen by qualified personnel, but should easily be completed with current qualifications.

The Project Manager, WES Engineering, has completed multiple similar projects in the previous ten years working developing wind projects. The proposed plan for development, construction, and operation utilizes available labor and expertise to build a successful project. The plans presented have contracted with critical expertise and are allowing standard construction skills to local competition. This will ensure that the necessary skills are available to ensure construction, while creating competition for other tasks, as necessary.

Operation and maintenance labor will be provided by several sources. Daily operating tasks are minimal. Owners will be provided with the necessary training to complete these tasks. The owners plan to hire employees or a sub-contractor to complete these tasks. Every six months requires accessing the turbine machine at the top of the tower. This initially will be completed by the manufacturers, although beyond that, there are multiple regional turbine maintenance companies that are familiar with direct drive induction generator turbines.

3. Market Feasibility

The electricity generated from the wind energy system is the primary by-product of the project. The rate of compensation for renewable energy is a key component of financial performance of the project, as it the market price and ability of the system owner to sell renewable energy credits (REC's). There are no raw materials that need to be procured to operate the wind energy system, though tools, parts, and labor will be needed for ongoing operations. Although the wind could itself be considered a raw material, there is no active ability of the project to procure the wind resource, independent of what is given via natural flows. As a result of the fact that raw materials are not an integral issue for the wind energy project, this section focuses on the arrangement and compensation of generated electricity, and the ability of Libman Wind Turbine Company, LLC to market and sell renewable energy credits.

The sale of electricity is based on the current agreement with Ameren Energy Marketing, the retail electricity supplier used by the Libman Company as well as the net metering rules operating in Illinois. These two aspects determine our estimate for the value of electricity as the Libman Company's energy load profile and turbine sizing will result in a percentage of energy being exported to the grid at certain points in time.

In Illinois, systems may net meter systems with up to 2,000 kW of generator capacity. For systems over 40 kW, exported energy is valued at a Qualifying Facility (QF) rate. The QF rate is based on utility avoided cost per PURPA regulations. This rate reflects the wholesale price that the energy supplier pays for their energy, prior to selling it to retail customers. QF rate structures can vary and the Libman Wind Turbine Company (Libman) will enter into a power purchase agreement (PPA) to address the QF rates. QF rates may change over time, with current prices reflecting very low wholesale market prices reflecting the current economic downturn.

WES Engineering supplied GDS Associates with the base agreement that Ameren Energy Marketing uses for QF contracts. Libman could choose an hourly rate per MISO hourly prices or a fixed rate that may change based on market conditions. The fixed rate option is likely the least risky and most beneficial for Libman as it will provide a known value for exported energy. WES Engineering supplied GDS with an analysis that explained the seasonal and time of use pricing for QF facilities weighted by the expected timing of energy production (summer/winter, on-peak/off-peak). Based on this presentation, WES Engineering estimates a weighted average value of $37.67 per MWh ($0.03767 per kWh). This value is in alignment with wholesale electricity prices in the region.

Most of the electricity produced from the wind turbine will be consumed by the Libman Company, offsetting their retail electricity purchases. Current modeling shows that the project can successfully cash flow with a transfer price of $0.054 per kWh to the Libman Company. Current purchased electricity is priced at $0.055 per kWh, illustrating that the turbine can enhance the Libman Company's competitiveness. In the financial modeling, GDS estimates that electricity prices will increase by two percent per year, a conservative estimate.

A final product market – Renewable Energy Credits (RECs) or Green Tags – may be a possible revenue source for the Libman Wind Turbine Company. Generally speaking, the market for these sorts of energy products or environmental attributes is very soft and determining whether this is a viable market for Libman would be highly speculative. In the financial analysis from the Libman Wind Turbine Company and WES Engineering, no value is given to RECs or Green Tags. GDS takes the same approach in its financial model. Indeed, there may be a need to assume that the environmental attributes of the electricity flow to the Libman Company, allowing them to make strong marketing claims regarding the environmental attributes of their products, with a value in excess of the actual price for the energy. As such, the absence of a REC or Green Tag market is not a challenge to the project, but illustrates conservative market and financial planning.

Based on our review, the Libman Wind Turbine Company (Libman) project is feasibility from a market perspective. Libman is working with skilled wind practitioners to bring the project to fruition, the turbine is available in the market, and the sale of electricity has a defined market structure already in place and in conformance with Illinois utility regulations.

4. Technical Feasibility

The Libman wind project is an effort to utilize a utility sized turbine for an individual customer. As discussed above, the project team is made up of capable firms and individuals with experience in the wind energy and the energy field. GDS was provided a large volume of documents that were reviewed to inform the technical feasibility portion of the project. In most cases it would be highly expensive and time consuming to repeat the analysis used to support the USDA Technical Report. As a result, GDS reviewed the documents for completeness and gaps. GDS conducted an analysis of the expected energy production from the turbine project. In summary, the project is technically feasible, with most, if not all technical and financial aspects of the project accounted for or planned. This section of the feasibility study presents the reviews of key factors.

Environmental Assessment

WES Engineering worked with Steven Faulk of NRC to review potential environmental impacts to the project, complete the NEPA Environmental Assessment (EA) required by the DOE federal grant, and identify any critical issues prior to project commencement. This process will adequately address the potential environmental, cultural and neighbor concerns adequately or the project will be terminated. Therefore these concerns are considered addressed in the Feasibility Report.

The EA required by this report is a standard government regulated process which will systematically review cultural, environmental, and historical impacts to determine if further study is necessary. Typically, Federal and State agencies charged with protection of a certain aspect of these particular impacts will be consulted to determine if there are any pre-existing conditions at the proposed location. Mr. Faulk will also be charged with contacting interested individuals and organizations to discuss the project, if it is determined to require further study. To date, Mr. Faulk has received letters from the US Fish and Wildlife Service, Illinois DNR, and State historic Preservation Office which state no expected impact, indicating a neutral and potentially positive impact on the environment.

The EA process is accepted as a way to receive input from nearby parties, interested groups, and consult the people necessary to protect natural and cultural resources. Provided that this process is completed, the proposed project is assumed that it will minimize or eliminate any environmental and cultural concerns to the extent possible.

Aviation Issues

The Federal Aviation Administration (FAA) oversees public airports in the United States. FAA permits are complete with permitted height up to 492' above ground. There are no major airports within 5 miles of the project. The Arcola airport is nearest at approximately 10 miles separation.

The FAA provided a "determination of no hazard to air navigation" to that elevation requires that the turbines be lit with FAA approved lighting. These lighting features are a standard part of utility scale wind turbine projects and the project budget reflects the inclusion of FAA lighting, $8,000.

Geotechnical

The project team will include a Geotechnical Engineer to perform soil boring to provide the necessary information to the project Foundation Engineer to design the spread foot foundation. Although the design of the foundation will vary based upon the results of the soil borings, there is no indication that major problems will arise.

The Construction Management team is also experienced in wind turbine foundation observations, creating a plan to verify proper installation of the foundation according to the design. This is critical to the safety of the turbine.

Delivery of Components

Turbine components will be delivered to the site from various manufacturing locations. It is expected that the delivery will take 6 months from the point of ordering the turbine that has been planned into the project schedule.

Delivery on US roads is generally restricted due to the size of the equipment. Although components are not overweight, the State's Department of Transportation will typically require travel at night by truck carrying large turbine components. This issue does not pose a risk to the project and project managers can manage the scheduling with minimal difficulty.

The Construction Management team has included in their scope of work to have a small crane on-site that is capable of moving the components from the trucks to the staging area. The staging area is adequate to hold the components.

The Wind Turbine

The project's choice of a Vensys 77 is based upon that machine's excellent reputation in the world market and ability to provide a single turbine to a customer. The company founded in 2000 is based in Germany. The initial project team that led to the formation of the company installed their first turbine in 1997 (600 kW). The first Vensys 77 model was installed in 2007 in Germany and there are over 1,100 Vensys turbines installed worldwide. Since then there have been installations and orders for multiple turbines in North America.

The Vensys 77 design includes features such as a synchronous generator with permanent magnets, pitch controlled blades for power control and braking, and a holding brake to lock out the rotor. There is an integrated microprocessor controlled remote monitoring control system for power output and blade control. The company offers a cold weather heater to reduce the potential for cold weather related operational concerns. The mechanical design has been simplified to reduce the number of moving parts, therefore reducing the need for maintenance.

The project has chosen Wavewind as the contractor. Wavewind is a regional contractor national and international experience. They have full construction management experience for large wind turbines and can safely and effectively manage the heavy lifting and technically challenging issues related to constructing large wind turbines. They intend to sub-contract the Civil/Site work to ensure required excavation, compaction and concrete work.

Vensys will have primary responsibility for the turbine and tower installation. This work includes start-up and commissioning of the turbine.

Any gaps in responsibility will be addressed by Wavewind prior to construction. Wavewind will also state the necessary insurance and certifications for each contractor to have during construction. Through this statement and contractor expertise, the work will plan to meet all applicable local, state and national building and electrical codes and regulations. Equipment installation will be completed in accordance with applicable safety and work rules.

The electrical interconnection will be designed by ITG/Henneman Engineering. The project interconnection will be completed at 12.47 kV. The switchgear and metering cabinet will be on the property and designed to meet the requirements of a qualified facility. The switchgear will also be provided to provide 12.0 kV power to the Libman side of the meter. Lighting protection will be completed via an integrated system in the wind turbine. Each blade includes a conductor wire that will be grounded in order to transfer a potential lightning strike safely to the ground without damaging the blades or turbine.

Estimated Turbine Productivity

The Libman Wind Turbine Company, through WES Engineering, has conducted a thorough investigation into the wind resource and turbine productivity estimates. The wind resource was evaluated through an installed met tower (Tower #1731), correlation to long term data and review of the previous study by AWS Truewind in 2007. The tower was installed on October 29, 2009 and collected data to the present. 5 months of data was included in this review.

In order to correlate this data to long term data sets, WES engineering purchased the data from the ASOS tower #725315 for reference. This tower is located at the Champaign Urbana Airport, approximately 24 miles from the site. Data from 1997 to present was included in the evaluation.

The correlation between the site data and the airport data was completed in a simulation program. This program determined many separate variables including the wind shear, which is used to determine wind speed at various levels. The data was used to determine the average annual wind speed at 85 meters is 6.89 m/s in the technical report.

The annual variation of this speed appears to be minimal from information in the review. In the past 13 years, the maximum variation from this number was approximately 5%. Therefore, in this Feasibility Report, GDS is using the average annual wind speed of 6.89 m/s for the average and 6.54 m/s for the conservative sensitivity analysis.

The annual wind speed was transformed into monthly data using a similar simulation for the annual average wind speed. The technical report then was able to develop monthly estimated electrical production numbers which will add up to the annual average production. The Technical Report supporting the USDA REAP application presents an estimated average annual production of 4,031,396 kWh per year per turbine.

The estimate was compared against a GDS based calculator tool that incorporates similar wind resource characteristic values and the power curve of wind turbines. Since it is not as sophisticated of a modeling tool as that used for the information in the technical report, it is not expected to match the output in the technical report. Although utilizing similar factors to the technical report, the estimated output was 4,086,514 kWh/year which is approximately 1% higher than the technical report model. As a result of this test, we estimate that the WES Engineering estimate for turbine productivity as a reasonable and conservative estimate.

GDS Tool Model Assumptions:

- Monthly wind speed data collected and analyzed is acceptable.
- 10% turbulence and direction change losses
- 3% maintenance down time per year

The WES numbers do not evaluate the annual wind speed variations because their review stated that the annual variation for the past 13 years has been less than 5%. For review of feasibility, GDS feels that this variation should be considered based upon the short term of data available in the context of financial performance. The GDS tool was utilized to evaluate a 5% reduction in average monthly wind speed at the hub height. The table below shows the results under the “Conservative” heading. The 5% reduction in wind speed leads to an 8% reduction in production. In order to find the conservative production estimate from the WES tool, the Annual Average production was multiplied by 0.92.

Annual Production (kWh)	Average Annual	Conservative
GDS Tool estimate	4,086,514 kWh	3,758,654 kWh
WES Tool estimate	**4,031,396 kWh**	*3,708,884 kWh*

In summary, the project production estimates appear to be realistic. Based on the financial estimates, below, an eight percent reduction in any year's production revenue stream will not adversely affect the ability of the project to maintain financial viability and will still allow for the project to meet debt obligations as well as good maintenance practice.

Estimated Turbine Operation and Maintenance

Vensys has supplied a separate contract to cover the first five years of warranty including bi-annual preventative maintenance and 24/7 monitoring. The monitoring program also includes the ability for a remote operator to reset the turbine, if necessary. Further, 10 hours of operator training is included for the turbine owners.

A reserve fund is recommended to be started to replace major components. The plan is to develop a fund that will receive 25 percent of the turbine's cost total over 20 years of equal payments. In addition, the Libman Company is carrying insurance for large equipment failure.

A formal Decommissioning Plan is developed for the project, and appears to be feasible, and is developed by Fehr Graham. The City of Arcola will need to approve the plan as part of the local permit. Specifically, the fund starts building at $5000 per year starting in year 11. A Libman corporate guarantee is placed for the decommission value until the specific fund has enough dollars to cover the estimated cost. This amount was calculated to be $39,462. The project decommissioning plan includes the use of a crane to take apart all turbine components and lower them to the ground, then remove all buried foundation components to a depth of 40" below the soil level and replace the foundation area with top soil, and remove underground cables and all unused portions of access road and crane pad. This site would then be de-compacted so crops could be grown over the site. Should the turbine be damaged beyond repair, there is an option to topple the machine and salvage the components for scrap steel. Currently, turbines have value as used machines and will be taken down and resold, the wind turbine is valued at $100,000 at the end of its 20 year life, for resale as a used machine.

5. Financial Feasibility

The Libman Wind Turbine Company supplied GDS Associates (GDS) with their financial factors and cash flow model. This model presents all project assumptions and is useful to test financial sensitivity and project cash flow viability. This model was used by GDS to provide the financial feasibility review. In the GDS review, the input assumptions were found to be reasonable, with calculations internally consistent and exhibiting good practices for managing wind project financial risk. GDS generated its own simplified pro forma capital budgeting cash flows, income statements, and balance sheets, which are presented in the exhibit at the end of this report.

Capital funding for the Libman project will come from several sources. A bank loan is available from JP Morgan Chase, with grants available from the USDA, Illinois Department of Commerce and Economic Opportunity (DCOE), and the U.S. Treasury grant conversion of the federal income tax credit. The Libman Company will provide the balance in the form cash equity. Each of these sources of capital is expected to be required to create a viable project. The DCOE funding has been confirmed as has the availability of the bank loan, pending final project review. In the case of the U.S. Treasury grant or tax credit, this funding is available per legislation. Only the USDA grant remains a question, which is the purpose of the application and supporting feasibility study.

GDS developed its own cash flow analysis to compare results with the pro forma presented by the Libman Company. While most of the GDS cash flow analysis correlated well with the presented cash flow, there were several differences. In the GDS model, we found that in years seven through ten, after accounting for all tax effects, the project has weak overall cash flow, but still maintains positive cash flow. This weakly positive cash flow is due to depreciation tax benefits being exhausted, while debt payments continued through year ten. The previous years' cash flow more than makes up for the shortfall and managing the equipment reserve and repair fund is one option to turn cash flow positive in a given year. That said, we recommend planning for these several years as lean years, though with many management options and previous income being ample to maintain all aspects of the project financial and operational plan.

The GDS model also tested for the debt service coverage ratio (DSCR). The ratio compares net operating income to debt payments (principal and interest). The DSCR is an indicator used by lending institutions to determine a project's ability to cover debt payments in the event of an economic situation. Indeed, the JP Morgan Chase letter confirming the loan availability indicated that a DSCR of 1.25 would be expected in order for the loan to be closed. In each of the ten years, the DSCR was at least 1.34, with the average DSCR being 1.45. The GDS analysis of DSCR did *not* include the substantial grant income used by the project to cover capital expenses in order to avoid co-mingling and confusing the results. This approach illustrates that the project will have a reasonable cash flow cushion to operate in each year, meeting all debt obligations.

Given that the Libman Wind Turbine Company is owned by Aaron Libman, GDS assumes that the base accounting and management systems in place at the Libman Company will be mirrored to support the turbine company. The ownership of an LLC and wind turbine is a relatively simple managerial and accounting task compared to operating a large and successful product development and manufacturing company. GDS has seen no evidence to suggest that the Aaron Libman would not be able to manage the accounting system for the Libman Wind Turbine Company to great success. Their current success in a difficult economic environment attests to their capabilities, reflecting excellent professional financial assistance.

The project appears to be financially viable with reasonably conservative assumptions driving planning and projections, a sign of a well considered project. That said, the project development is not without risk. Absent the USDA grant funding, it is unlikely the project can proceed. Debt coverage and rates of return would suffer to the point that the project may not be financially viable. However, once operating, the project has planned key risk management solutions to address equipment failures and plan for later project life expenses.

6. Management Feasibility

The Libman Wind Turbine Company will be the sole owner of this wind turbine for the purposes of selling the generated electricity. This company will be managed by Aaron Libman, the sole member.

Mr. Libman has a Masters Degree in Industrial Engineering and Operation Research and Manufacturing. He is also a co-owner in the Libman Company. His experience operating the Libman Company, managing the operation of large equipment and adjusting to varying expenses and billings will translate easily to wind turbine management. It is expected that experience within the Libman Company will be able to manage the wind turbine operation.

The operation and maintenance of the turbine is covered by the proposed contract for five years. The remaining expected life of the turbine can be covered under a similar plan. If that plan is not continued, it is expected that several regional wind turbine installers who are familiar with induction turbine generators will be able to provide the maintenance. Large turbine installers will be able to support for equipment replacements or other work requiring crane work.

7. Qualifications

GDS Associates, Inc. is a multi-service consulting and engineering firm formed in 1986, and headquartered in Marietta, Georgia, with regional offices in Manchester, New Hampshire; Austin, Texas; Auburn, Alabama; and Madison, Wisconsin. Since its formation, GDS has gained experience in helping clients succeed by anticipating and understanding their needs and efficiently delivering quality service with confidence and integrity. GDS has a long history of meeting client needs through hands-on initiatives and establishing long-term relationships by promoting a partnership perspective.

The primary author of this study is Richard Hasselman. Mr. Hasselman is a Project Manager for GDS Associates, Inc. Mr. Hasselman holds an a MS Degree in Land Resources with a certificate in Energy Analysis and Policy from the University of Wisconsin, and a MBA from the University of Wisconsin Madison. He also holds a BA degree in Geography from Radford University. Mr. Hasselman has provided numerous clients with feasibility studies for wind energy (small and large turbine) and other renewable energy sources. Mr. Hasselman is a certified wind site assessor by the Midwest Renewable Energy Association and is a certified Carbon Reduction Manager from the Association of Energy Engineers.

Mark Bergum, an engineer for GDS Associates is a Professional Engineer and LEED Accredited Professional. Mr. Bergum earned a B.S. in Civil Engineering from Washington University in St. Louis with a Minor in Environmental Engineering. Mark has performed wind energy assessments for a variety of clients and participated in numerous feasibility studies. Mr. Bergum provided the engineering review of the Libman Wind Turbine Company feasibility study.

Exhibit One – Financial Spreadsheets

Simple Payback Cash flow

simple payback per retail offset and QF rate

Year		1	2	3	4	5	8	9	10	15	20
First Cost	(3,600,000)										
O&M		(1,500)	(1,530)	(27,561)	(28,112)	(28,674)	(30,429)	(31,038)	(31,658)	(34,954)	(38,591)
DCOE		300,000									
ITC Grant		972,000									
Depreciation Tax $		218,914	350,263	210,158	126,095	126,095					
Revenue/Savings		222,192	226,636	231,168	235,792	240,507	255,228	260,333	265,540	278,809	292,741
REAP Grant		300,000									
Grant Tax		-									
Electricity Usage		(800)	(816)	(832)	(849)	(866)	(919)	(937)	(956)	(1,059)	(1,165)
Insurance		(10,500)	(10,710)	(10,924)	(11,143)	(11,366)	(12,061)	(12,302)	(12,548)	(13,855)	(15,297)
Lease and Easement Payments		(2,000)	(2,040)	(2,081)	(2,122)	(2,165)	(2,297)	(2,343)	(2,390)	(2,639)	(2,914)
Decommissioning Fund		-	-	-	-	-	-	-	-	(5,000)	(5,000)
Equipment Reserve		(25,000)	(25,500)	(26,010)	(26,530)	(27,061)	(28,717)	(29,291)	(29,877)	(32,987)	(36,420)
Revenue Tax		(78,100)	(79,662)	(81,256)	(82,881)	(84,538)	(89,713)	(91,507)	(93,337)	(98,001)	(102,896)
Total	(3,600,000)	1,885,205	456,640	292,662	210,248	211,932	91,092	92,914	94,772	90,318	90,455
Cumulative Cash Flow, no ER	(3,600,000)	(1,879,795)	(1,222,855)	(929,482)	(718,713)	(506,250)	(173,584)	(80,106)	15,251	468,009	924,819

Payback 9.9 Years

Cash flow With Financing

Annual kWh	4033980										
Note: assumes 1% decrease in energy production each year starting in year 11											
Wind Energy System											
Cash Flow with Financing											
Year		1	2	3	4	5	8	9	10	15	20
First Cost	(2,700,000)										
O&M		(1,500)	(1,530)	(27,561)	(28,112)	(28,674)	(30,429)	(31,038)	(31,658)	(34,954)	(38,591)
DCOE		300,000									
Federal Tax Credit		972,000									
Depreciation Tax $		218,914	350,263	210,158	126,095	126,095					
Revenue/Savings		222,192	226,635	231,168	235,792	240,507	255,228	260,333	265,540	278,809	292,741
REAP Grant		500,000									
Grant Tax		-									
Electricity Usage		(800)	(816)	(832)	(849)	(866)	(919)	(937)	(956)	(1,056)	(1,165)
Insurance		(10,500)	(10,710)	(10,924)	(11,143)	(11,366)	(12,061)	(12,302)	(12,548)	(13,855)	(15,297)
Lease and Easement Payments		(2,000)	(2,040)	(2,081)	(2,122)	(2,165)	(2,297)	(2,343)	(2,390)	(2,639)	(2,914)
Decommissioning Fund		-	-	-	-	-	-	-	-	(5,000)	(5,000)
Equipment Reserve		(25,000)	(25,500)	(26,010)	(26,530)	(27,061)	(28,717)	(29,291)	(29,877)	(32,987)	(36,420)
Loan Principle		(68,281)	(72,378)	(76,721)	(81,324)	(86,203)	(102,670)	(108,830)	(115,360)	-	
Loan Interest		(54,000)	(49,903)	(45,560)	(40,957)	(36,078)	(19,612)	(13,451)	(6,922)		
Interest Tax Effect		18,981	17,541	16,014	14,396	12,681	6,893	4,728	2,433		
Revenue Tax		(64,111)	(65,393)	(57,562)	(58,713)	(59,887)	(63,553)	(64,824)	(66,120)	(98,001)	(102,898)
Total	(2,700,000)	2,005,895	366,169	210,089	126,532	126,984	1,864	2,044	2,140	90,318	90,455
Cumulative Cash Flow	(2,700,000)	(694,105)	(327,936)	(117,846)	8,686	135,670	203,470	205,513	207,654	658,302	1,110,479

Pro Forma Income Statement

Income	Year 1	Year 2	Year 3	Year 4	Year 5
Electric Sales - Grid	222,192	226,635	231,168	235,792	240,507
Taxable Grant Income	0				
Total Revenues	222,192	226,635	231,168	235,792	240,507
Expenses					
Electricity	-800	-816	-832	-849	-866
Insurance	-10,500	-10,710	-10,924	-11,143	-11,366
Lease and Easement Payments	-2,000	-2,040	-2,081	-2,122	-2,165
Decommissioning Fund	0	0	0	0	0
Equipment Reserve	-25,000	-25,500	-26,010	-26,530	-27,061
Total Operating Expenses	-38,300	-39,066	-39,847	-40,644	-41,457
Operating and Net Income					
Operating Income	183,892	187,569	191,321	195,147	199,050
Bank Loan Interest	-54,000	-49,903	-45,560	-40,957	-36,078
Total Interest	-54,000	-49,903	-45,560	-40,957	-36,078
Depreciation	-180,000	-180,000	-180,000	-180,000	-180,000
Taxable Income	-50,108	-42,334	-34,240	-25,810	-17,028
REAP Grant	300,000				
Production Tax Credit	$ -	$ -	$ -	$ -	$ -
Investment Tax Credit	$ 1,080,000	$ -	$ -	$ -	$ -
Aggregate Loss Carry Forward	0	-50,108	-92,442	-126,682	-152,492
Loss Carry Forward	0	0	0	0	0
Taxable income after LCF	-50,108	-42,334	-34,240	-25,810	-17,028
ITC Carry Forward					
Federal Tax	0	0	0	0	0
State Tax	0	0	0	0	0
Taxes Paid	1,080,000	0	0	0	0
Net Income	**1,083,892**	**7,569**	**11,321**	**15,147**	**19,050**

Pro Forma Balance Sheet, Five Years

Year	1	2	3	4	5
Assets					
Cash	$ 1,195,610	$ 1,310,802	$ 1,425,402	$ 1,539,225	$ 1,652,072
Fixed Assets	$ 3,600,000	$ 3,600,000	$ 3,600,000	$ 3,600,000	$ 3,600,000
Less Accumulated Depreciation	$ (180,000)	$ (360,000)	$ (540,000)	$ (720,000)	$ (900,000)
Total Assets	$ 4,615,610	$ 4,550,802	$ 4,485,402	$ 4,419,225	$ 4,352,072
Liabilities					
Debt, outstanding	$831,719	$759,341	$682,620	$601,296	$515,093
Total Liabilities	$ 831,719	$ 759,341	$ 682,620	$ 601,296	$ 515,093
Owners' Equity					
Capital Stock and Paid -In - Capital	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000
Retained Earnings	$ 1,083,892	$ 1,091,461	$ 1,102,782	$ 1,117,929	$ 1,136,979
Total Owners' Equity	$ 3,783,892	$ 3,791,461	$ 3,802,782	$ 3,817,929	$ 3,836,979
Total Liabilities and Owners' Equity	$ 4,615,610	$ 4,550,802	$ 4,485,402	$ 4,419,225	$ 4,352,072

Exhibit Two – Signature and Date

This feasibility study was completed by Richard Hasselman, M.S., MBA, and Mark Bergum, P.E. and provides our best professional judgment regarding the proposed project as it relates to the USDA REAP project feasibility analysis.

Richard Hasselman, M.S., MBA
GDS Associates, Inc.
Project Manager
June 10, 2010

Mark Bergum, P.E.
GDS Associates
Project Engineer
June 10, 2010

Attachment D-4
Vensys 77 Turbine Specifications

VENSYS 70/77

Technical Description

Rev.: A
Datum: 13.11.06

Dokumentname:
VS70/77_TECHNICAL_DESCRIPTON

Editor:

Checked:

Dipl.-Ing. (FH) D. Weinhold

Dipl.-Ing. (FH) C.Contini

VENSYS Energiesysteme GmbH & Co. KG
Saar-Lor-Lux-Straße 15 • 66115 Saarbrücken
T +49 681 97043-0 • F +49 681 97043-11

1. Index

2. List of changes

Instructions:

- If the content of the text is changed, the pages with the new text are added to the document and the old ones are removed.
  The new pages have the current number of version and the current revision.
- if this changes the number of pages or whole pages are added, the additional pages have the resp. page number AND a consecutive letter (e. g. Page 1 a)
- If the document is changed completely, the paging is done anew.

Nr.	Stand	Page	Comment	Date	Name
1	Rev. A		First Edition	06.11.06	Weinhold
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

3. Subject to Change

The following technical description of the VENSYS 70/77 wind energy converter (WEC) was updated November 2006. Future product development may result in differences in actual versus theoretical specifications and operating data. As such, this document may be subject to change.

Technical changes without notice.

4. WEC types

The technical description is valid for the following WEC types:

WEC Type	Hub Height	Blade	Wind Class	Wind Zone	Code
VENSYS 70	65m HH	APX70	IEC IIA	DIBt 3	VS70P15T65K2BAPX70
VENSYS 70	65m HH	LM34	IEC IIA	DIBt 3	VS70P15T65K2BLM340
VENSYS 70	85m HH	APX70	IEC IIA	DIBt 3	VS70P15T85K2BAPX70
VENSYS 70	85m HH	LM34	IEC IIA	DIBt 3	VS70P15T85K2BALM340
VENSYS 77	61.5m HH	LM37.3	IEC IIIA	DIBt 2	VS77P15T61k5K3BLM373
VENSYS 77	85m HH	LM37.3	IEC IIIA	DIBt 2	VS77P15T85K3BLM373
VENSYS 77	100m HH	LM37.3	IEC IIIA	DIBt 2	VS77P15T100K3BLM373

5. General Information

The VENSYS 70/77 is a gearless wind energy converter and is equipped with a three-blade rotor, pitch control with a rated output of 1.500 kW. This converter generates electric current that is fed directly into the public grid. Optimum aerodynamic rotor efficiency, at every wind speed, is achieved by using variable speed technology.

Highlights:

Highly efficient multipole generator

- Direct coupling of the multipole generator to the rotor

  → No gearbox required
  → Practical application of advanced technologies

- Synchronous generator with permanent magnet excitation

  → High efficiency, particularly at partial load
  → No energy losses because of an external excitation
  → No slip rings for external excitation needed

- External runner concept

  → Compact design, small generator diameter

- Passive air-cooling system

  → Highly efficient cooling without any additional energy

Blade pitch system and safety system

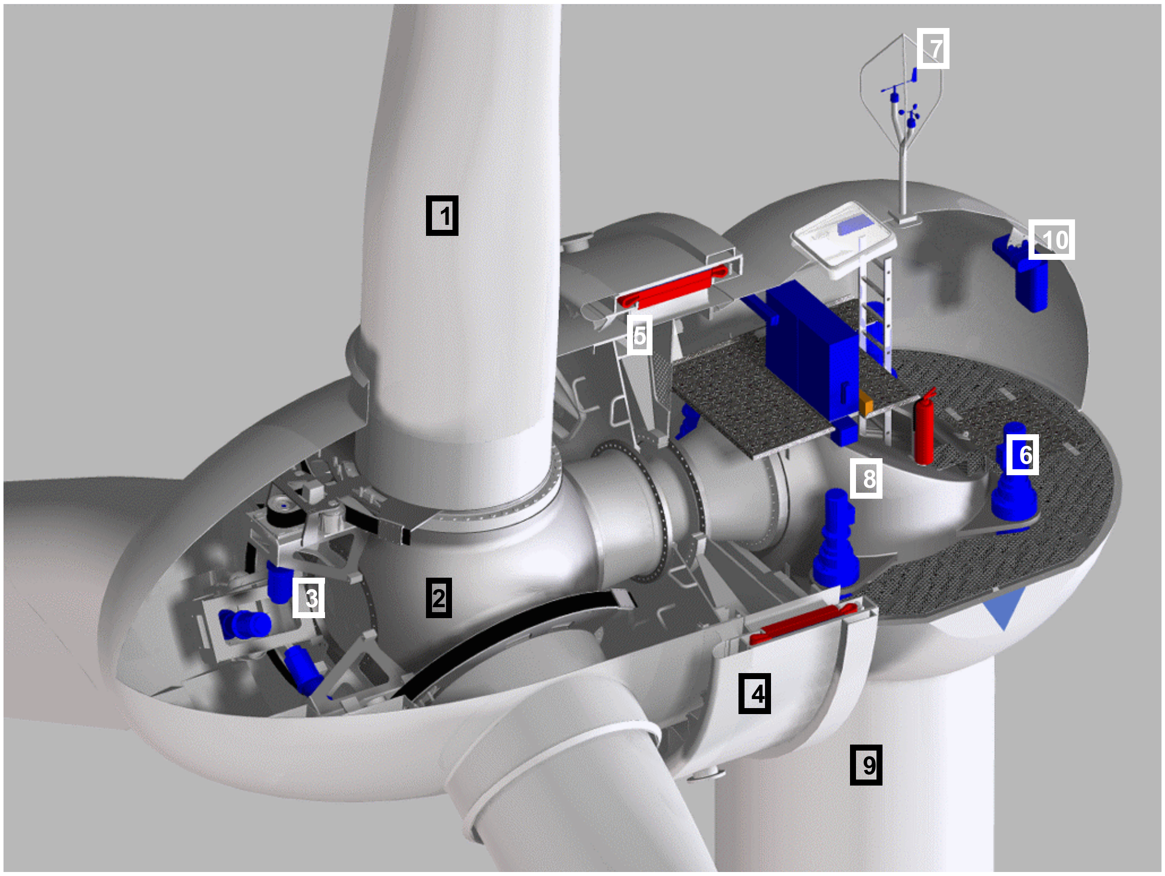
- Blade pitch system with tooth belts

  → Lubrication not required
  → Minimum play in blade drive tracks
  → Minimum wear
  → Maintenance free

- Double-layer capacitor for emergency re-pitching

  → No heavy lead-gel accumulators required
  → Brush-less pitch motor
  → Increased lifetime
  → Maintenance free

6. Design Tower head



1	Rotor blade	6	Yawing system
2	Casted hub	7	Wind measurement system
3	Blade pitch system	8	Machine base
4	Generator-rotor	9	Tower
5	Generator-stator	10	Auxiliary crane

7. Rotor

The VENSYS 70/77 aerodynamic rotor blades convert translational air motion into a motion of the rotor. This motion is initiated by aerodynamic lift forces.

The wind energy converter VENSYS 70/77 has a three-bladed rotor that is equipped with active blade pitch system. The rotor are made of reinforced fibreglass, have a rotor diameter of 70/77 m, and a swept area of 3850/4657 m^2. The blades possess integrated lightning protection. Potential lightning strikes will be conducted from the rotor blade through the casted parts and the tower to the foundation.

Each rotor blade has a pitch bearing that connects the blade to the casted hub. The rotor blades will be automatically pitched according to the wind speed, to limit the rotor power output or to brake the rotor down wear-free. For maintenance, the rotor can be locked.

8. Multipole Synchronous Generator

The generator converts the rotational energy of the rotor into electrical energy. It is a multipole synchronous generator with permanent magnet excitation. The turbine rotor drives the generator rotor directly (i.e. no gearbox).

The generator consists of the following components:

- Generator stator with six-phase winding
- Generator rotor with permanent magnets

The generator is fully maintenance and wear-free (with the exception of the main bearing).

Generator Stator

The generator stator is a welded structure that acts as the supporting structure for the stator core and the six-phase winding.

The laminated core consists of separate segmental core blanks. To avoid wakes the core blanks are insulated against each other. After insertion of the six-phase winding the stator will be impregnated with high-quality insulating resin. Cooling fins are punched into the back of the stator core to increase surface area and heat emission. The patented, passive air-cooling system directs airflow with an air duct directly along the outside of the stator core. This air-cooling system provides the advantage of encapsulating the active electrical components, thereby avoiding corrosion of the active generator part .

Increasing wind speeds result in increased power generation as well as increased heat production. This heat build up must be cooled away to avoid overheating of the generator. However, the maximum cooling effect is achieved just at high wind speeds. This self-cooling turbine eliminates the need for active fans and pumps.

Generator Rotor

The welded structure of the VENSYS 70/77 generator - rotor placed outside the stator. The use of permanent magnets in combination with the external rotor design results in a smaller external diameter of the generator in comparison to traditional turbines. The VENSYS 70/77 external rotor is only a few millimetres larger than the air gap diameter while the standard design protrudes to the package height and to the stator supporting structure over the air gap. Generators with smaller external diameter have the advantages of being lighter and easier to transport.
The generator rotor is directly driven by the turbine rotor. On the inside of the rotor yoke, permanent magnets generate the necessary excitation field. By using a direct driven multi-pole synchronous generator the conventional main gear is omitted and many advantages recognized. Gearboxes have been traditionally, particularly on today's megawatt class turbines, sensitive to overloading and premature failure.

Gearboxes are noisy which necessitates expensive noise insulation measures. Gearless units do not require gear oil servicing nor do they produce leaks. Furthermore, there are no gear losses which is a great advantage particularly at partial load. As such, these advantages will result in higher energy output, lower insurance costs, increased turbine lifetime, and lower overall operating and maintenance costs.

9. Frequency Converter

The connection to the public grid is done by a frequency converter system and a transformer. Both components are situated inside the WEC tower basement so an additional separated transformer, typical for conventional turbines, is not necessary. The frequency converter has been specially designed for the use together with synchronous generators. It allows a complete separation of the generator operation from the grid conditions. So variable speed operation of generator, in a speed range of 9 to 19 rpm, (VENSYS 70) and 9 to 17.3 rpm (VENSYS 77), is possible. This provides a better energy yield at partial load. At rated load and above the structural loads on the turbine are reduced by this technology.

At the generator output side, a 12 – pulse uncontrolled rectifier with a subsequent step-up converter is used to avoid voltage peaks (du/dt loads) in the generator windings, which has a very simple, but robust layout.

In the grid-side converter part, two separate IGBT-twigs per phase are used, which reduce harmonics. The whole converter system is air-cooled.

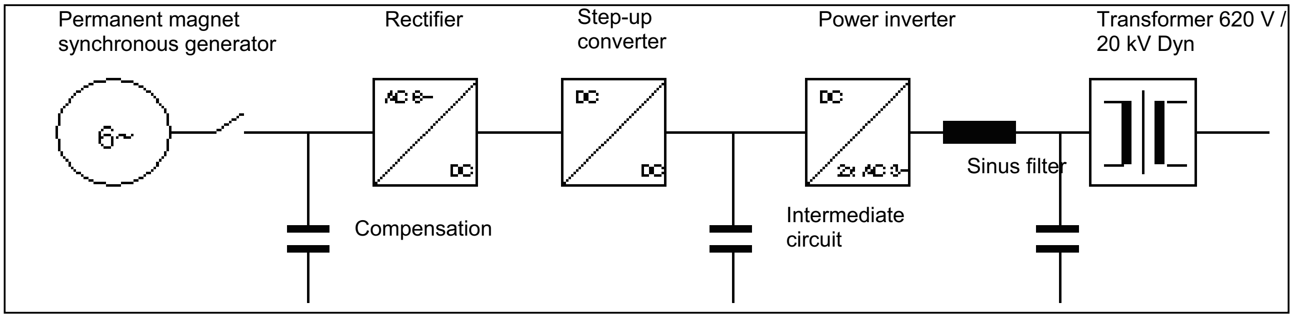


Figure 3 : Design converter system

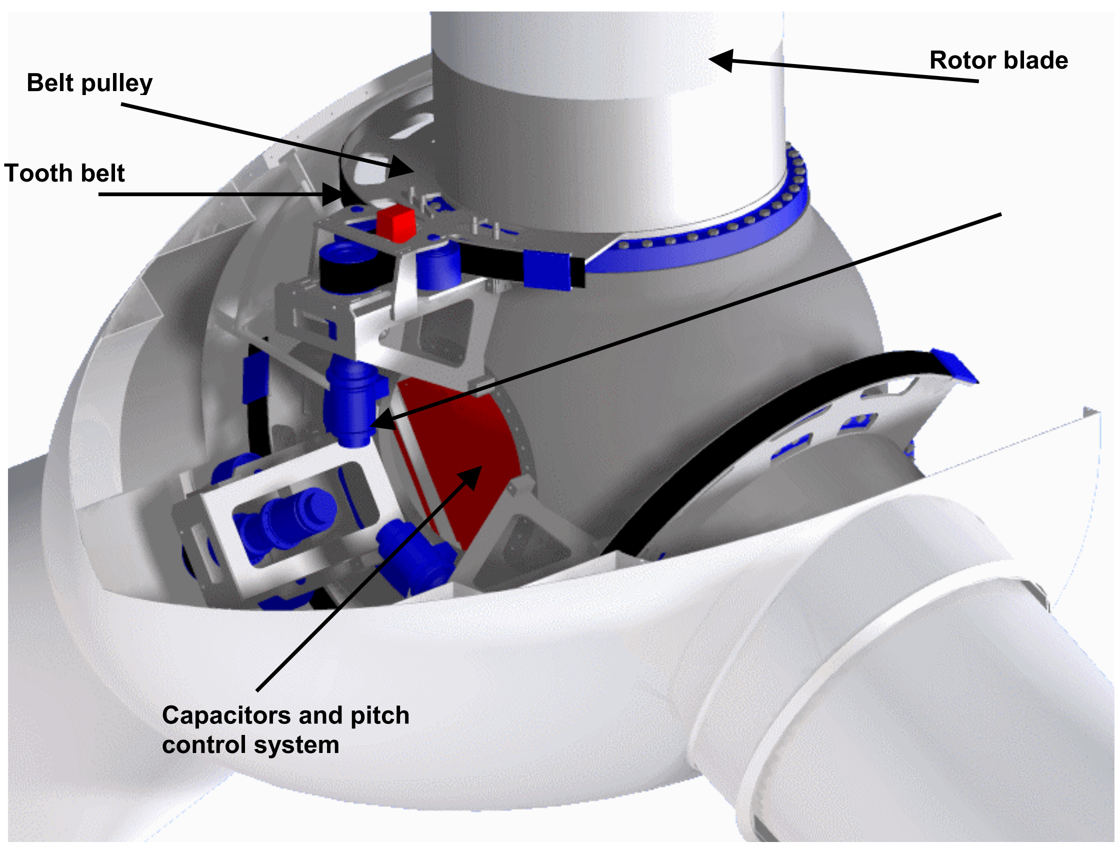
This converter system provides the following advantages:

- no torque peaks in case of grid failure
- 50 Hz or 60 Hz line frequency without hardware modification
- no pole angle transmitter on the generator needed
- symmetric intermediate circuit avoids HF-loading on the generator – side (leakage currents and du/dt-loading of the windings)
- no HF-loading of tower cable
- 2 IGBT sets to reduce harmonics
- integrated line filter
- high variable speed range
- insensitive to grid failure
- high efficiency with diode rectifiers
- no audio frequency suppressor needed
- freely adjustable power factor
- fixed power factor (only available on certain markets)
- Power factor control for stabilisation of grid is possible even when the wind energy converter is stopped
- Complies with new EON-directive concerning the WEC's performance in case of grid failure

10. Blade pitch and brake system

The blade-pitch system of the VENSYS 70/77 allows each blade to be pitched independently. This provides power control and aerodynamic braking capabilities for the wind energy converter. At rated wind speed and above the power input of the rotor will be limited by the pitch system to 1,500 kW. This feature avoids overloading of generator and converter system. The controller monitors power output, blade pitch angles and wind conditions as well as variable speed operation to ensure optimal operating performance.

The three blade pitch mechanisms of the turbine also serve as a rotor brake. Moving the rotor blades into feathering position reduces the rotor torque and acts as a brake. The blade pitch system consists of three independent electrical drive trains with energy storage and a tooth belt power train. Each drive train consists of a three phase brush-less motor, a converter, a power supply unit, a position sensor and a capacitance storage system.
The capacitors eliminate the need for heavy and lead accumulators. The drives used work brush-less. All signals are transmitted by a DC-isolated profibus port, which is protected against over-voltage. Unique to the VENSYS 70/77 is the tooth belt transmission between the drive motor and rotor blade. This connection is insensitive to shock loading because, as opposed to gear transmission, several teeth are always in contact. The tooth belt does not require lubrication and is insensitive to moisture and dirt.



11. Nacelle Design

The nacelle has to transmit all static and dynamic loads of the rotor and the generator to the tower. In addition, the nacelle houses the control cabinet, the service crane, the yawing system, and supports the wind monitoring system (anemometer / wind-vane). Essentially, the housing consists of three parts: a casted part for transmission, a walk able base platform, and a shell made of reinforced fibreglass.

The casted part is connected to the tower via a yaw bearing, that also forms the connection between tower and rotor resp. generator. The generator-stator and the axis with the bearing are fixed to the casted part, whereas the generator-rotor and with it the machine-rotor are connected pivot-able to the axis. All necessary system components are mounted to the platform that is fixed to the casted part. The shell protects the sensitive components against weather.

The yawing system is screwed directly to the casted part. The nacelle can be reached via a ladder from the highest tower platform. There is enough room for the service staff and all components can be reached easily . A hatch in the bottom of the shell on the opposite side of the machine-rotor allows loads to be lifted into the nacelle with the service crane.

12. Yawing System

The yawing system aligns the rotor with the wind direction, which is given by a wind vane installed on top of the nacelle. This wind data provides the basis for yaw corrections via electrical operated yaw motors. These motors are geared to the external teeth of the yaw bearing between the tower and the cast machine base.

The nacelle is held in its position by hydraulic operated brake callipers, that hold a brake disk which is connected with the tower. At high wind speeds, the nacelle is adjusted to the wind direction even if the wind energy converter is stopped to reduce the occurring loads.

13. Control System

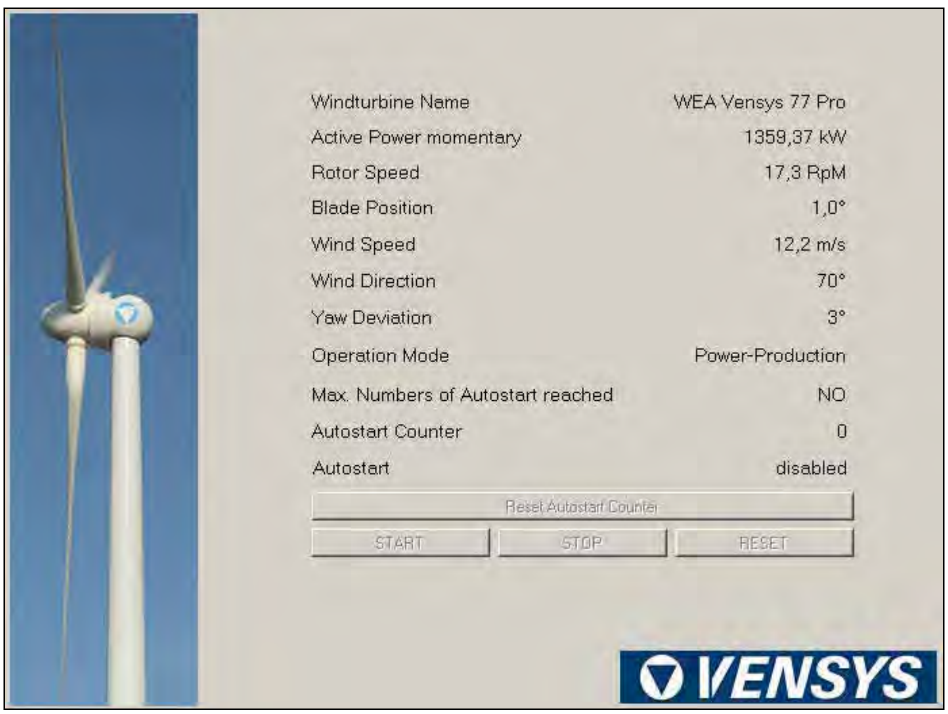
The VENSYS 70/77 has a microprocessor based control unit that independently adjusts and controls the turbine’s operating parameters. As such, outside data entry or control is not required.

The control unit uses sensors to retrieve information about external conditions (wind speed, wind direction) and all operating parameters of the wind energy converter (power, rotor speed, blade pitch). Basing on this data, the plant management controls the turbine to optimise energy yield and to ensure safe turbine operation.

At partial load the rotor speed is adjusted by modifying the generator output. At rated load and above the nominal power capacity is achieved with blade pitch adjustment. As such, gusts can be converted into an increased rotational speed rather than increasing torque. The latter behaviour is typical for conventional fixed speed technology. The VENSYS 70/77 is able to "absorb" wind speed changes and act as an energy cache memory.

The turbine operates in a wind speed range of 3 m/s to 25 / 22 m/s. The wind turbine automatically stops operating outside this velocity range.

External monitoring of the operating performance of the turbine is possible by a PC modem and a telephone connection. Thus, all operating data, records and turbine conditions can be retrieved.



14. Tower

The steel tower supports the nacelle and the rotor and transfers the loads and forces of the turbine into the foundation.

The tower consists of segments held together by screw flange connections. It is connected to the foundation by the foundation insert. The yaw bearing is screwed directly on the top tower flange. The control cabinet, converter, transformer and the medium voltage switchgear are mounted at the tower base. The tower is equipped with an internal cat ladder c/w a fall guardrail. Relax or safety platforms are installed at regular distances in the tower. The top platform has a cat ladder allowing access to the nacelle. The tower and the nacelle are lighted. In case of power failure, an emergency light ensures good working conditions.

Inside the tower there are also power and signal cables. The signal cables are trouble-free optical fibre. The cables hang in the upper section to allow the yawing of the nacelle and after several yaw rotations the wind energy converter will automatically untwist the cables. The base of the tower is accessible from outside by a stair and a door.

15. Foundation

The foundation secure and stabilize the WEC. It is designed as so-called raft or floating foundation. The rotor loads are transferred by the tower and the tower section to the foundation. The foundation section is a short steel tube which is integrated in the foundation. The upper layer of the steel reinforcement at the concrete runs through radial holes in the foundation section.

16. Technical Data

Rotor	Diameter	70 / 77 m
	Swept area	3,850 / 4657m^2
	Speed range	9 – 19 / 17.3 rpm
	Number of blades	3
	Blade type	LM 34 P / LM 37.3 or similar
	Power control	Pitch
	Brakes	Blade pitch triple-redundant
	Holding brake	Anchor locking

Tower	Type	Steel tube
	Hub height	65 m, 85 m / 61.5 m, 85 m 100m

Operating Data	Cut-in wind speed	3 m/s
	Rated wind speed	13 / 12.5 m/s
	Cut-out wind speed	25 / 22 m/s
	Survival wind speed	59.5 / 52 m/s
	Noise emission	expected
	Calculated power curve	available

Generator	Type	Multipole synchronous generator, permanent magnet excited
	Design	Direct drive
	Rated power	1.500 kW
	Rated voltage	Y 700 V
	Insulation category	F

Converter	Type	IGBT - Converter

Yawing System	Design concept	Electrical drive motor
	Rate of movement	0,5 °/sec
	Yawing system	Brake 10 - hold

Transformer	Type	Casting resin transformer 1.670 kVA
	Input voltage	620 V
	Output voltage	20 kV (other voltages are possible)

Control System	Functionality	Microprocessor controlled remote monitoring

Masses	Rotor	ca 31.900 kg
	Nacelle (excl. rotor)	ca 54.200 kg
	Tower	depending on the hub height

17. Calculated Power Curve VENSYS 70

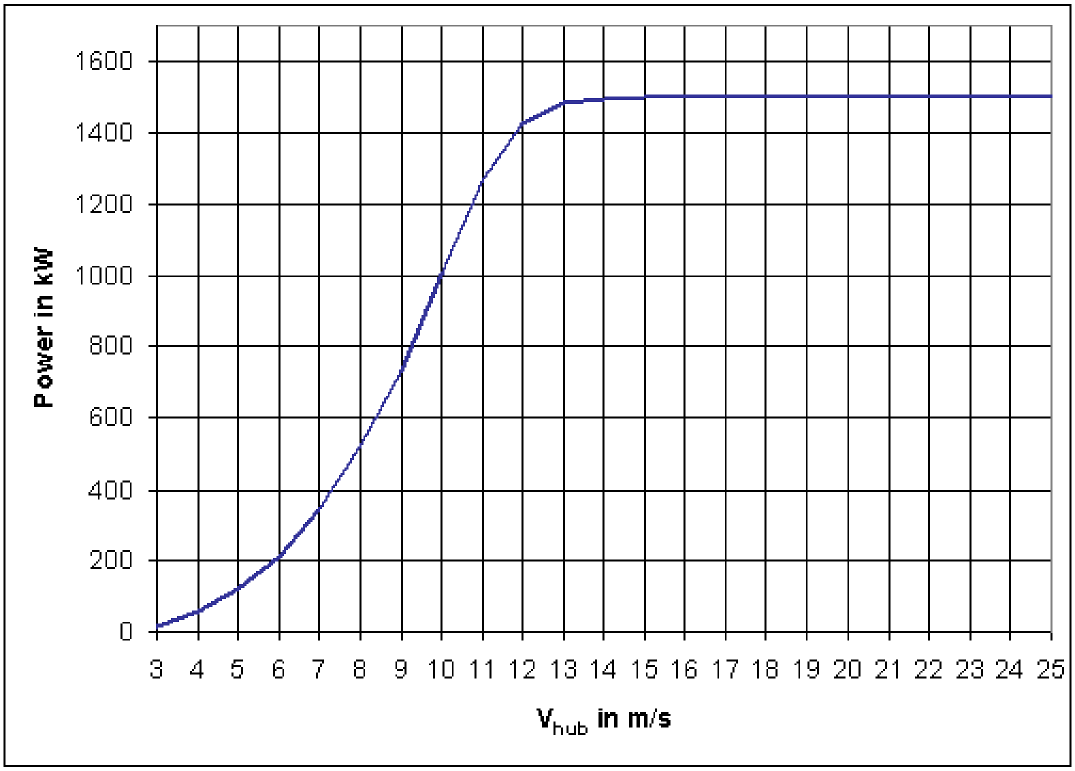
V_{hub} in m/s	P_{Grid} in kW
3	14.4
4	56.8
5	120.6
6	213.2
7	342.0
8	521.4
9	735.6
10	1002.0
11	1269.1
12	1425.1
13	1483.4
14	1498.3

V_{hub} in m/s	P_{Grid} in kW
15	1,500.0
16	1,500.0
17	1,500.0
18	1,500.0
19	1,500.0
20	1,500.0
21	1,500.0
22	1,500.0
23	1,500.0
24	1,500.0
25	1,500.0

V_{hub} = 10-min-avarage value of the wind speed at hub height

P_{Netz} = grid power

Air density: 1.225 kg/m^3
Turbulence intensity: 10% const



18. Calculated Power Curve VENSYS 77

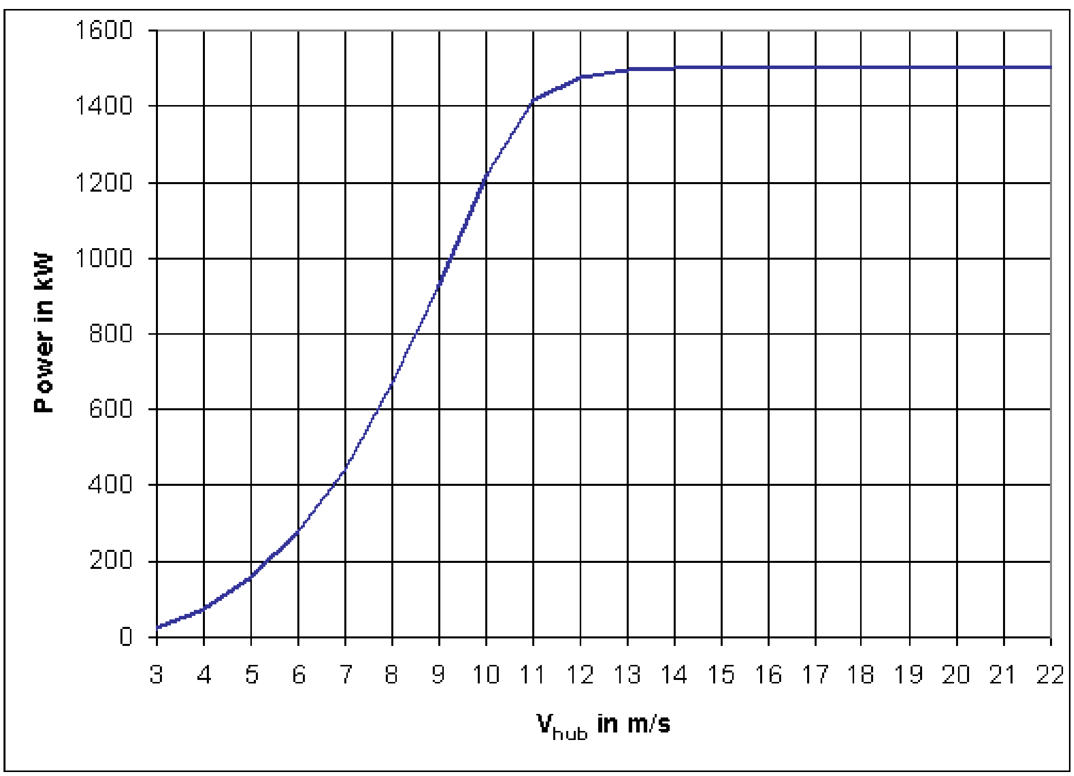
V_{hub} in m/s	P_{Grid} in kW
3	21.9
4	75.1
5	155.8
6	274.3
7	439.3
8	668.0
9	932.1
10	1215.4
11	1418.2
12	1473.7
13	1496.5
14	1500.0

V_{hub} in m/s	P_{Grid} in kW
15	1,500.0
16	1,500.0
17	1,500.0
18	1,500.0
19	1,500.0
20	1,500.0
21	1,500.0
22	1,500.0
23	1,500.0
24	1,500.0
25	1,500.0

V_{hub} = 10-min-avarage value of the wind speed at hub height

P_{Netz} = grid power

Air density: 1.225 kg/m^3
Turbulence intensity: 10% const



Attachment D-5
Acoustic Report for a Wind Turbine Type Vensys 77

windtest
grevenbroich gmbh

Acoustic report for a wind turbine type Vensys 77 at the testing field for wind turbines near Grevenbroich

Measurement 2007-11-30

Full Report

2008-01-23

SE07015B2

Frimmersdorfer Str. 73 · D-41517 Grevenbroich · Phone +49 (0) 2181 2278-0 · Fax +49 (0) 2181 2278-11 · info@windtest-nrw.de · www.windtest-nrw.de

Geschäftsführerin / Managing Director: Dipl.-Geol. Monika Krämer · Handelsregister/Commercial Register: Amtsgericht Mönchengladbach HRB 7758
USt.-IdNr./VAT No.: DE 183895079 · Steuer-Nr./Tax-ID. 114/5777/0301
Bankverbindungen/Bankaccount: Sparkasse Neuss: BLZ 305 500 00, Kto.-Nr. 800 272 04 · IBAN DE: 74305500000080027204 · BIC: WELA DE DN

Acoustic report for a wind turbine type Vensys 77 at the testing field for wind turbines near Greven-broich

Report SE07015B2

Location:	testing field Grevenbroich, WEC 2, Ser.-No. V001

Customer:	Vensys Energy AG Saar-Lor-Lux-Str. 15 D-66115 Saarbrücken

Supplier:	windtest grevenbroich gmbh Frimmersdorfer Str. 73 D-41517 Grevenbroich / Germany

Date of Order:	2007-10-29	**Order Number:**	07 0112 06

Auditor:	**Editor:**
Dr. Markus Koschinsky	Dipl.-Ing. Thomas Fischer

Grevenbroich, 2008-01-23

1 Conceptual formulation

windtest grevenbroich gmbh (windtest) was ordered 2007-10-29 by Vensys Energy AG to:

- determine the apparent sound power level as characteristic parameters of noise emission in accordance with IEC 61400-11 [1] of a wind energy converter (WEC), type Vensys 77, hub height H = 85 m (including base), located at the testing field Grevenbroich (WEC 2, Ser.-No. V001).

2 Measurement execution

2.1 Measurement procedure selection

Methods of measurement and determination were, according to the order, based on the following regulation: „IEC 61400-11, Wind energy turbine generator systems – Part 11: Acoustic noise measurement techniques, 2002-12“ [1] and “IEC 61400-11:2002, Amendment 1: Wind turbine generator systems – Part 11: Acoustic noise measurement techniques, June 2006”.

The apparent sound power level and tonality for various integer wind speeds at a height of 10 m as well as for that wind speed at a height of 10 m, at which the WEC operates at about 95 % of its rated power (in case this is reached below a wind speed of 10 m/s in 10 m height) are specified.

2.2 Measurement object

The object to be measured was a WEC, type Vensys 77, during continuous operation in normal operation mode (Fig. 1).

2.2.1 Acoustic sources

The sound of a WEC is the combination of several single acoustic sources. Components like generator, fans, transformers and converter are mentioned here as examples. The sound emissions of the different sources leave the apertures in the gondola (nacelle) and the tower directly and are as well transferred as mechanical vibrations by the machine housing. Some of these sources can cause tonality noises.

The noise created by aerodynamical effects, represents the second essential acoustic source. They are caused by the rotation of the rotor blades. These wideband noises depend on the blade tip speed in first place and in the second on the blade profile and the pitch angle.

The technical data of the WEC are as stated in Tab. 1. More detailed information about the components of the WEC are given in the manufacturer’s specification in the appendix.

Tab. 1: Technical data of the WEC

Manufacturer	Vensys Energy AG
WEC type	Vensys 77
Serial No.	V001
Location	testing field Greven-broich
Rated power	1500 kW
Performance control	Pitch
Hub height ab. ground	85 m
Tower design	conical steel tube
Position of blades to the tower	luv
Number of blades	3
Rotor diameter	77 m
Blade type	LM 37.3p2
Rotational speed / range	17,3 / 9...17,3 rpm
Gear type	gearless
Generator type	VENSYS, VS 1500_88BLW

Fig. 1: WEC Vensys 77

2.3 Measurement location

The WEC is situated with further WECs at the testing field Grevenbroich. The environment is used agriculturally. The nearby surrounding of the WEC was not tilled by the time of measurement.

2.4 Measurement setup

The installation of the measuring point was chosen according to [1]. The measurement of noise emission was performed using a microphone mounted on a soundproof board (diameter 1 m) in $R_{0,chosen}$ = 126 m distance to the centre of the WEC tower (comp. Fig. 2).

$$R_0 = H + D/2 \pm 20\% \quad \text{(H: hub height; D: rotor diameter)}$$

The sound pressure levels (operating noise (BG) and background noise (HG)) were recorded by a sound pressure level meter. Additionally the sound was recorded with a digital audio tape (DAT) recorder. The damping influence of the secondary wind screen is less than 0,1 dB and is not taken into account any further.

The electrical apparent power of the WEC was measured, deviating from /1/, using the provided interface and was stored by means of an analogous digital converter on the hard disk of the computer.

As the WEC of type Vensys 77 can be operated in different operational modes, the generator speed and the pitch angle of the turbine has been recorded while measuring. The information has been taken from the control panel of the WEC by a special electronical device and was stored also onto the hard disk of the computer.

Wind direction and wind speed at a height of 10 m were measured by a wind vane and anemometer fixed on a mast in a distance of 85 m upwind from the WEC. Signals were also analogue-to-digital transformed and saved onto the hard disk of the computer.

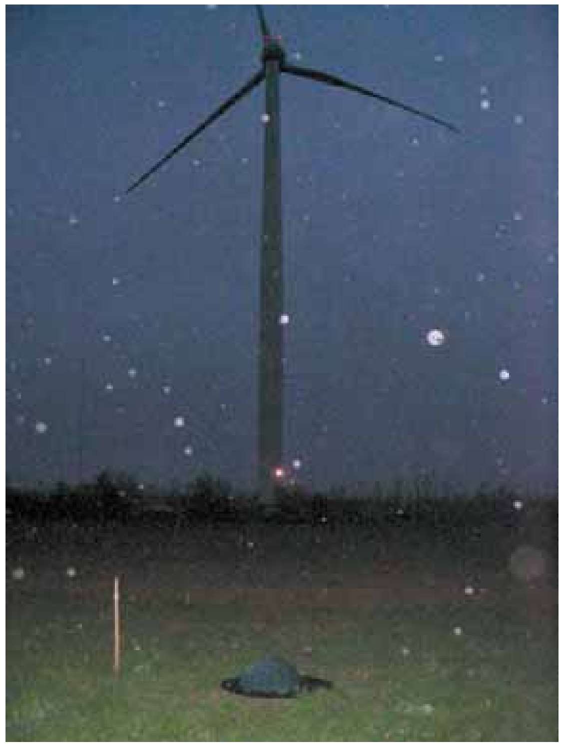


Fig. 2: Microphone

All recordings of meteorological, acoustical and WEC data were synchronised with an accuracy of less than one second.

All devices used for recording signals are listed in Tab. 2.

To ensure accuracy of data and measurement at any time, all devices are revised within certain periods as stated in [1].

All acoustic measurement instruments were calibrated before and after measurement with an acoustic calibrator.

Tab. 2: Used measuring devices

Device	Manufacturer / type / serial No.	Calibrated until	Internal device No.
Microphone	Norsonic, Type 1220, Serial No. 28372	31.12.08	WTGMT 981
Noise level meter	Norsonic 110, Serial No. 13594	31.12.08	WTGMT 975
DAT Recorder	Sony TCD-D10, Serial No. 266737		WTGMT 045
Calibrator	Brüel & Kjaer, Type 4231, Serial No. 2162810	12.09.08	WTGMT 269
Primary wind screen	Norsonic		
Secondary wind screen	Windtest, Schulze-Brakel		WTGMT 1132
Devices meteorological measurments			
Wind measuring mast 11,40 m	Teksam Clark-Mast, Type OT 12M/HP, Serial No. 6K4820		WTGMT 996
Anemometer	Vector, Type A100L2, Serial No. 6034	02.01.09	WTGMT 501
Wind vane	Thies, Type 4.3124.30.012, Serial No. 705033		WTGMT 1134
Signal transformer	Schuhmann, Type Waz5 Pro RTD		WTGMT 788
Barometer	Vaisala, Type PTB100A		WTGMT 743
Thermometer/hygrometer	Galltec, Type KPC 2/6 ME		WTGMT 776
Devices hardware + software			
Data logger	IMC µ-MUSYCS, Serial No. 99031200		WTGMT 364
Computer	Asus L8400, Serial No. 12NG032430		WTGPC 179
Data acquisition software	WTG Technik		
Data analysis software	IMC Famos Version 3.2 Rev. 6		
Data analysis software	IMC Frame		

2.5 Measuring performance

The measurement was performed 2007-11-30 from 16:00 until 22:15. During the measurement of the sound emissions, the neighbouring WEC was taken out of operation. The appeared wind speeds at a height of 10 m above ground ranged from 4,5 m/s up to 9 m/s (1 min average). The produced effective power ranged from 400 kW up to 1500 kW (1 min average).

While measuring the noise during operation, the WEC was in normal operation mode.

Sound pressure level, effective power, rotational speed and pitch angle, as well as wind speed and wind direction at a height of 10 m were measured and recorded simultaneously.

Periods with disturbing noises (as passing cars, planes, etc.) during the measurement have been excluded later during the analysis of apparent sound power level for operating noise and back-ground noise.

2.6 Meteorological conditions

The temperature, the air pressure and the humidity have been measured meanwhile the measurement. The meteorological conditions were as stated in Tab. 3.

Tab. 3: Meteorological conditions during time of measurement

cloudiness	*cloudy*
air pressure	*996 hPa*
air temperature	*9°C*
relative atmospheric humidity	*85 %*

3 Measurement Results

3.1 Subjective sense of noise

Mainly aerodynamic noise from rotating blades could be noticed. Furthermore, tonality noise (about 80 Hz and 2750 Hz) could be noticed sometimes in the nearby vicinity of the WEC and at the reference position.

On the whole, the operating sound of the WEC can be stated as inconspicuous.

3.2 Directional characteristic

From subjective listening tests no obvious directional characteristic of the operating sound could be found.

3.3 Sound pressure level

For the analysis of noise characteristics within different wind conditions, the measured parameter (as 1 sec. values) are differentiated and analysed according to their state. It is distinguished between periods of operating noise („BG“, state = 1) and background noise with stopped WEC („HG“, state = 0,5). State = 0 means, that the data are excluded from the analysis, because of disturbances, partly missing data, different operating modes etc. The measured raw data are shown in the appendix.

From the time charts of effective power, wind speed, wind direction and sound pressure level all values with state = 1 or state = 0,5 were extracted. Arithmetical average over 1 min of wind speed, wind direction and electric power were calculated and the corresponding energetic average of sound pressure level were used for the following evaluation of the sound characteristics of the WEC.

All data are filtered for the wind direction to be within ±15° from the downstream direction with respect to the microphone position. Fig. 3 and Fig. 4 shows the noise characteristic of the WEC regarding to measured wind speed (met mast) and the electric power output:

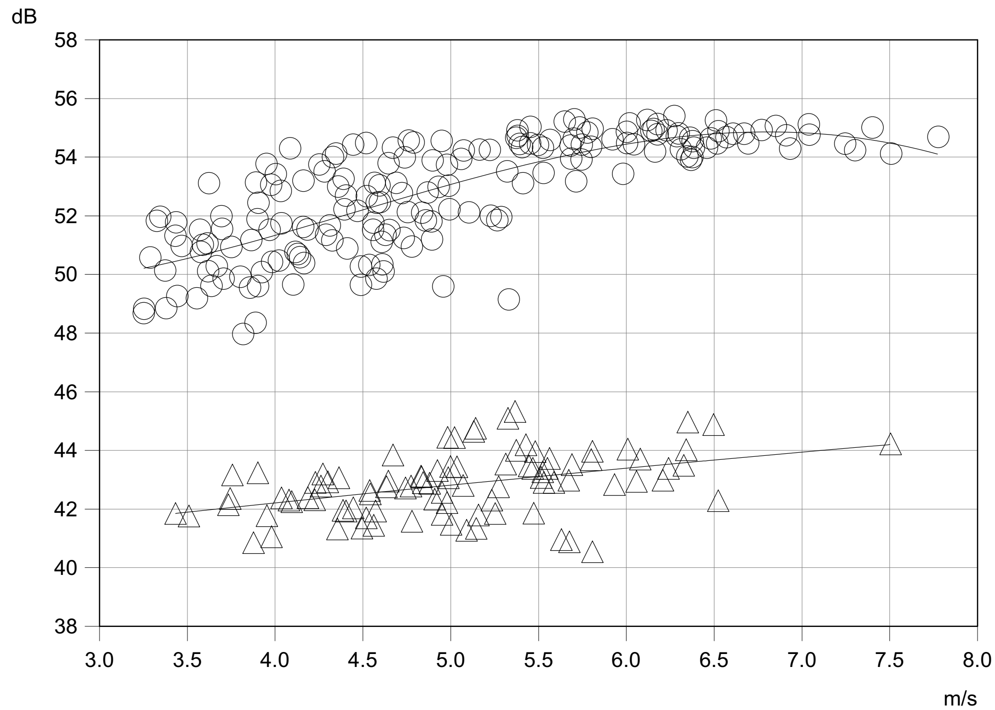


Fig. 3: Sound pressure level versus measured wind speed (met mast)

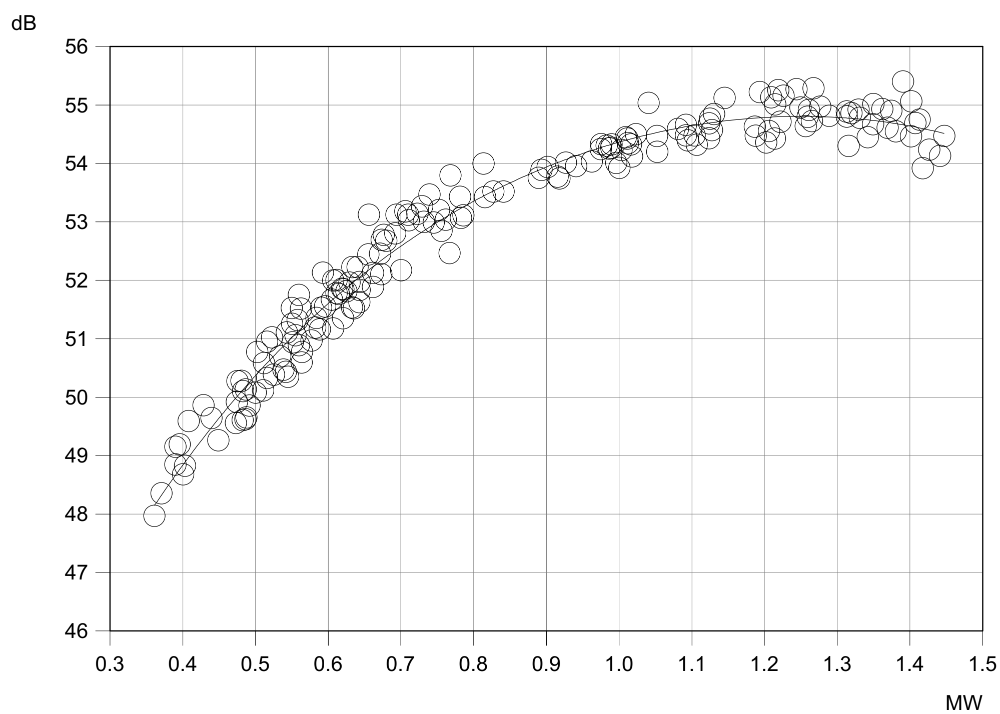


Fig. 4: Sound pressure level versus measured electrical power

3.4 Apparent sound power level

According to the first method of wind speed determination in [1], the measured effective power is transformed into a wind speed at hub height by means of the power curve of the WEC.

The wind speed at hub height is corrected according to [1] with regard to air density and reference height (10 m above ground), applying a logarithmic approximation, with the reference length z_0 0,05 m.

From both the resulting standardised wind speeds and the simultaneously measured wind speeds at the wind measuring mast, a correction factor κ was determined for the measured wind speeds. For this measurement the correction factor has a value κ = 1,27. The κ-factor was used to correct the measured background wind speeds as well as the measured wind speeds for data points exceeding 95 % of rated power.

Data pairs, which exhibit an average electric power over 95 % of rated power, are shown in square symbols in Fig. 5. They are depicted versus their measured and κ-corrected wind speed. Data points over 95 % of rated power, but with κ-corrected measured wind speed below the wind speed corresponding to 95 % of rated power, are omitted.

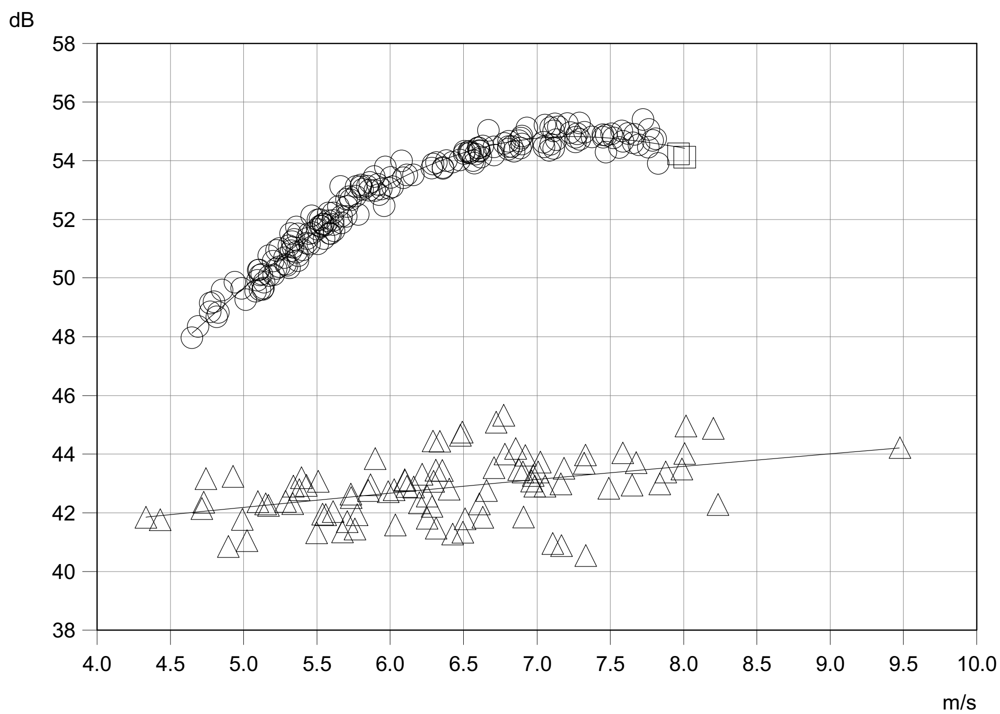


Fig. 5: Sound pressure level of operating noise versus standardised wind speed
*Regression operating noise O: 98,13 – 47,203 * X + 13,7219 * X^2 - 1,54573 * X^3 + 0,060336 * X^4 [dB]*
*Regression background noise Δ: 39,47 + 0,590 * X - 0,0096 * X^2 [dB]*
Data pairs over 95% of rated power

For integer values of wind speed from 5 m/s up to 8 m/s the difference of operating noise and background noise has been determined from the regression equations, as well as the values at 95 % of rated power. By means of that level difference ΔL_{Aeq} the background noise correction has been applied to the measured operating noise with the following equation:

$$L_{Aeq,c} = 10\lg\left[10^{(0,1*L_{Aeq,BG+HG})} - 10^{(0,1*L_{Aeq,HG})}\right]$$

From the background corrected sound pressure level $L_{Aeq,c}$ the apparent sound power level L_{WA} was calculated for all wind speeds from 5 m/s up to 8 m/s as follows:

$$L_{WA} = L_{Aeq,c} - 6\mathrm{dB} + 10 \cdot \log(4\pi \cdot \frac{R_i^2}{1\mathrm{m}^2}) \qquad \mathrm{dB}$$

$$\text{with } R_i = \sqrt{(R_o + N_A)^2 + (H - h_A)^2}$$

and R_0 = 126 m, N_A = 3,915 m, H = 85 m, h_A = 0 m

The apparent sound power levels of the WEC Vensys 77 in the present configuration (normal operation mode) are listed in Tab. 4.

Tab. 4: Apparent sound power level of WEC Vensys 77

Wind speed at 10 m height (v_{10m})	**BIN 5** **4,5–5,5 m/s**	**BIN 6** **5,5–6,5 m/s**	**BIN 7** **6,5–7,5 m/s**	**BIN 8** **7,5–8,5 m/s**	**> Bin 8**
Operating noise ($L_{Aeq, BG}$ / dB)	49,7	53,2	54,8	54,4	--
Background noise ($L_{Aeq, HG}$ / dB)	42,2	42,7	43,1	43,6	--
Difference level (ΔL_{Aeq} / dB)	7,5	10,5	11,7	10,8	--
Corrected noise ($L_{Aeq,c}$ / dB)	48,9	52,8	54,5	54,1	--
Sound power level (L_{WA} / dB)	**97,6**	**101,6**	**103,3**	**102,9**	**≤ 102,9**
Generator speed (n / rpm)	14,1	16,7	17,2	17,2	17,2
Pitch angle [°]	1,6	1,6	1,7	4,5	≥ 4,5
Electrical Power (P / kW)	444	778	1168	1431	≈ 1500

1) 95 % rated power

From the shown data above 95 % of rated power it is obvious, that no increase of sound power level for higher wind speeds has to be expected.

3.5 Further sound characteristics

No distinct impulsive character noise could be noticed. Further special sound characteristics, which might be supposed to draw attention on the WEC, could not be noticed.

3.6 Level of single noise events

Single events like starting or stopping the WEC, which exceeded the normal operating noise to a noteworthy content, could not be noticed.

3.7 Tonality analysis

The noise (operating and background) is sampled with 40 kHz and a 20 kHz antialiasing filter and then Fourier transformed.

For each wind speed bin 12 samples of operating noise are used, each of them 10 s duration. The frequency resolution is 2 Hz, therefore 20 spectra of 0.5 s time windows have to be averaged. A Hanning window is applied.

For background noise a 2 minute sample is used, with a frequency resolution of 2 Hz, too.

From these spectra tonal audibilities $\Delta L_{a,k}$ are determined according to [1].

3.7.1 Results of the tonality analysis

The operating noise of the Vensys 77 contains tonal components in the spectrum with 80 Hertz and with 2500 - 3000 Hertz. The results of the analysis in the respective bin's were performed in table 5 and table 6. The spectra are shown in the appendix 6.

Tab. 5: Tonality

Spectrum No.	BIN 6		BIN 7		BIN 8**		BIN > 8	
	f_T [Hz]	$\Delta L_{j,k}$ [dB]	f_T [Hz]	$\Delta L_{j,k}$ [dB]	f_T [Hz]	$\Delta L_{j,k}$ [dB]	f_T [Hz]	$\Delta L_{j,k}$ [dB]
1	76	-3,22	82	-1,94	80	-13,24	80	-13,25
2	76	-0,63	80	0,30	80	-2,53	80	4,48
3	76	2,37	80	-0,86	80	-2,75	80	0,18
4	74	-2,64	80	-13,24	80	3,50	80	-13,24
5	76	1,03	80	-13,24	80	2,77	80	0,64
6	80	2,93	80	2,56	80	2,71	80	2,25
7	80	-13,24	80	-6,11	80	-13,24	80	-0,01
8	80	-13,24	80	-3,49	80	-13,24	78	1,99
9	80	-13,24	80	-13,24	80	-4,54	78	-1,85
10	80	-3,82	80	-13,24	80	-13,24	80	1,22
11	80	-13,24	80	-13,24	80	-1,12	80	1,47
12	80	-13,24	80	-13,24	80	-13,24	80	3,97
Energetic average ΔL_k [dB]		**-4,05**		**-5,55**		**-3,53**		**-0,97**
Tonal audibility $\Delta L_{a,k}$ [dB]		**-2,04**		**-3,54***		**-1,52**		**1,03**

Tab. 6: Tonality

Spectrum No.	BIN 6		BIN 7		BIN 8**		BIN > 8	
	f_T [Hz]	$\Delta L_{j,k}$ [dB]	f_T [Hz]	$\Delta L_{j,k}$ [dB]	f_T [Hz]	$\Delta L_{j,k}$ [dB]	f_T [Hz]	$\Delta L_{j,k}$ [dB]
1	*	*	*	*	2750	-4,38	2750	-5,04
2					2750	-9,58	2750	-3,78
3					2750	-6,48	2750	-8,60
4					2750	-8,96	2750	-8,87
5					2748	-7,72	2750	-11,82
6					2750	-8,47	2750	-8,98
7					2750	-9,12	2750	-6,57
8					2650	-6,68	2700	-2,55
9					2750	-7,72	2750	-6,43
10					2750	-6,26	2750	-7,94
11					2750	-6,53	2750	-7,62
12					2750	-9,64	2750	-4,78
Energetic average ΔL_k [dB]						**-7,34**		**-6,22**
Tonal audibility $\Delta L_{a,k}$ [dB]						**-3,49***		**-2,37**

*) No appreciable tones with $\Delta L_{a,k}$ > -3,0 dB

**) 95 % of rated power at 7,9 m/s

Note 1: Tonality sounds can sometimes be noticed subjectively about 80 Hertz. Additionally, high-frequency tonalities can sometimes be noticed (about 2.5 kHz to 3 kHz) which are probably to be assigned to the power electronics.

Note 2: The stated tonality is only valid for the nearby vicinity of the WEC. These values cannot be transferred directly to longer distances (several 100 meter).

3.8 Turbulence intensity

The turbulence intensity (TI) has been determined according to [1] from the measured wind speed averages of 10 minute time series and the corresponding standard deviations.

The turbulence intensity has been 21 % on average.

This value is measured in 10 m height and cannot be compared directly to values in other documents like site assessment evaluations.

3.9 Operating mode

For this measurement the wind turbine has been in normal operation mode. In order to define the operational mode meanwhile the measurement, the rotational generator speed and the pitch angle have been measured. These values have been correlated to the output power of the turbine as 60 s average values (Fig. 6 and Fig. 7).

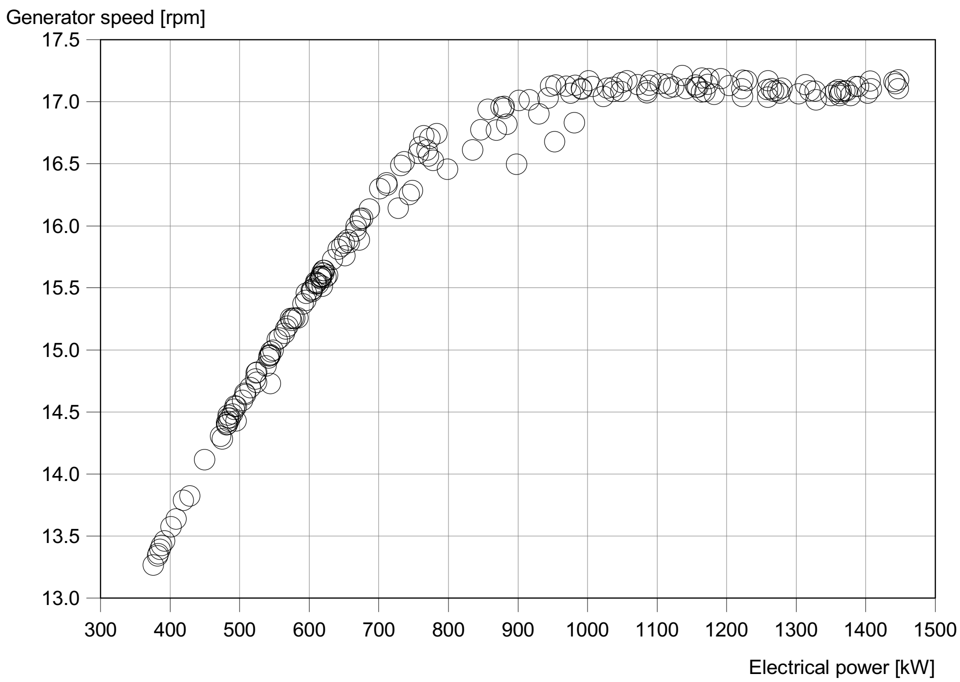


Fig. 6: Rotational generator speed versus power

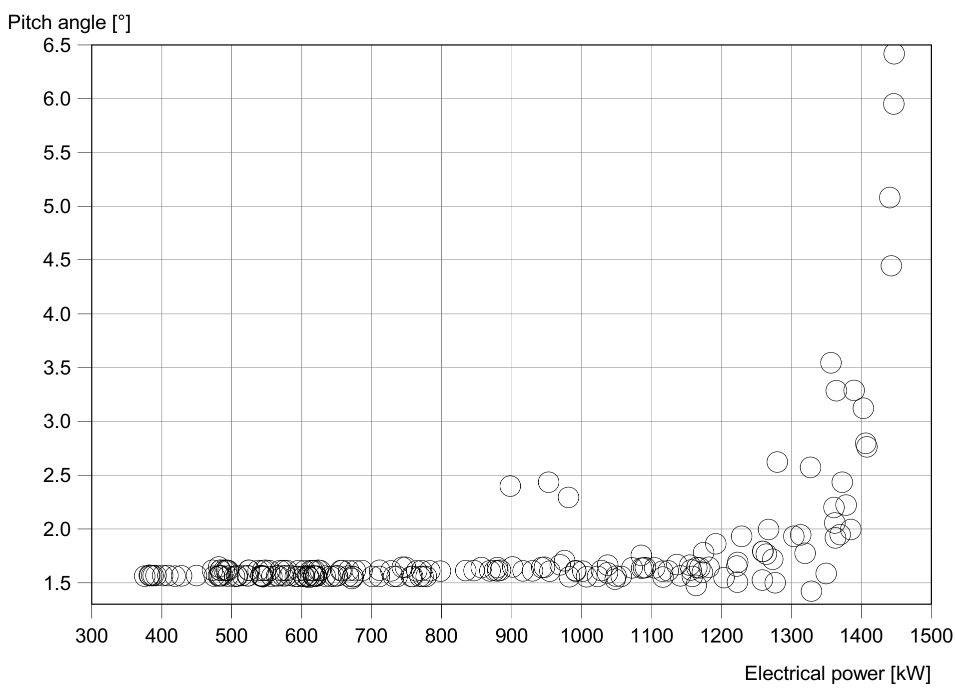


Fig. 7: Pitch angle versus power

4 Measurement uncertainty

4.1 Measurement uncertainty type A

From the measured sound pressure levels and the calculated sound pressure levels (regression analysis) the measurement uncertainty type A has been calculated at a wind speed of 7 m/s as a reference value. According to [1] a value is calculated for the average stray of single data points with regard to the regression curve:

$$U_A = \sqrt{\frac{\sum (L_{Aeq,mess} - L_{Aeq,bin})^2}{N-2}}$$

The data analysis gives a value of U_A = 0,26 dB.

Deviating from [1], here the uncertainty of the regression value is used for the further calculations instead of the average stray of single data points. Therefore, the number of data points within the wind speed bin has to be taken into account as $1/\sqrt{N}$. This leads to a value of

$U_{A,regr}$ = 0,03 dB.

4.2 Measurement uncertainty type B

The uncertainty of measurement type B was estimated as shown in Tab.7:

Tab. 7: Measurement uncertainty type B

	margin of errors ± a	likely error $U_a = a/\sqrt{3}$
acoustic calibrator UB1	± 0,3 dB	0,17 dB
sound pressure level meter UB2	± 0,3 dB	0,17 dB
sound proof board UB3	± 0,5 dB	0,29 dB
measurement distance UB4	± 0,1 dB	0,06 dB
air impedance UB5	± 0,2 dB	0,12 dB
turbulence UB6	± 0,7 dB	0,40 dB
wind speed UB7	± 0,3 dB	0,17 dB
background UB8	± 0,3 dB	0,17 dB

4.3 Estimation of the measurement uncertainty U_c

From the measurement uncertainties type A and B results the combined uncertainty U_C of the given sound power level for 7 m/s:

$$U_C = \sqrt{U_{A,regr}{}^2 + U_{B1}{}^2 + U_{B2}{}^2 + U_{B3}{}^2 + U_{B4}{}^2 + U_{B5}{}^2 + U_{B6}{}^2 + U_{B7}{}^2 + U_{B8}{}^2}$$

U_C = 0,6 dB

This value can be taken as a reference value for the uncertainties of the sound power levels at other wind speeds as well.

5 Summary

As ordered by the customer Vensys Energy AG, windtest grevenbroich gmbh has measured the noise emission of a WEC type Vensys 77 with a hub height of 85 m (including the base) according to IEC 61400-11 [1].

The measurement has been performed on 2007-11-30 at the testing field Grevenbroich on the WEC with the serial no. V001 and the wind farm no. 2, in normal operation mode.

A distinct directional characteristic could not be measured for this turbine. Single noise events, exceeding the average noise of the turbine more than 10 dB could not be noticed. Nor any other special noise characteristics like impulsivity could be stated.

The tonality analysis according to IEC 61400-11 [2] for the measured WEC noise in 126 m distance, shows partly minor tonality with 80 Hertz.

Generally speaking, the operating noise of the wind turbine Vensys 77 can be stated to be inconspicuously.

For the given sound power levels a measurement uncertainty of typical 0,6 dB has been found.

The data analysis gives the following noise values for the single wind speed bins:

Tab. 8: Measurement results for the Vensys 77, normal operation mode

Wind speed in 10 m height (v_{10m})	**BIN 5 4,5–5,5 m/s**	**BIN 6 5,5–6,5 m/s**	**BIN 7 6,5–7,5 m/s**	**7,9 m/s [1)]**	**BIN 8 7,5–8,5 m/s**	**> Bin 8**
Sound power level (L_{WA} / dB)	**97,6**	**101,6**	**103,3**	**103,0**	**102,9**	**≤ 102,9**
Tonality ($\Delta L_{a,k}$ / dB)	--	-2,04	-3,54	-1,52	-1,52	1,03
Generator speed (n / rpm)	14,1	16,7	17,2	17,2	17,2	17,2
Pitch angle [°]	1,6	1,6	1,7	4,0	4,5	≥ 4,5
Electrical Power (P / kW)	444	778	1168	1425	1431	≈ 1500

1) 95 % of rated power

It is assured that the testing of the sound performance of the WEC Vensys 77 was performed according to the state of technology, independently and impartially and to the best of our knowledge and conscience.

The results presented in this report only refer to and apply on this WEC.

Grevenbroich, 2008-01-23

Thomas Fischer

Dipl.-Ing. Thomas Fischer

6 Bibliography

[1] IEC 61400-11, Wind turbine generator systems - Part 11: Acoustic noise measurement techniques
Second edition, 12-2002

[2] IEC 61400-11:2002, Amendment 1: Wind turbine generator systems - Part 11: Acoustic noise measurement techniques, June 2006

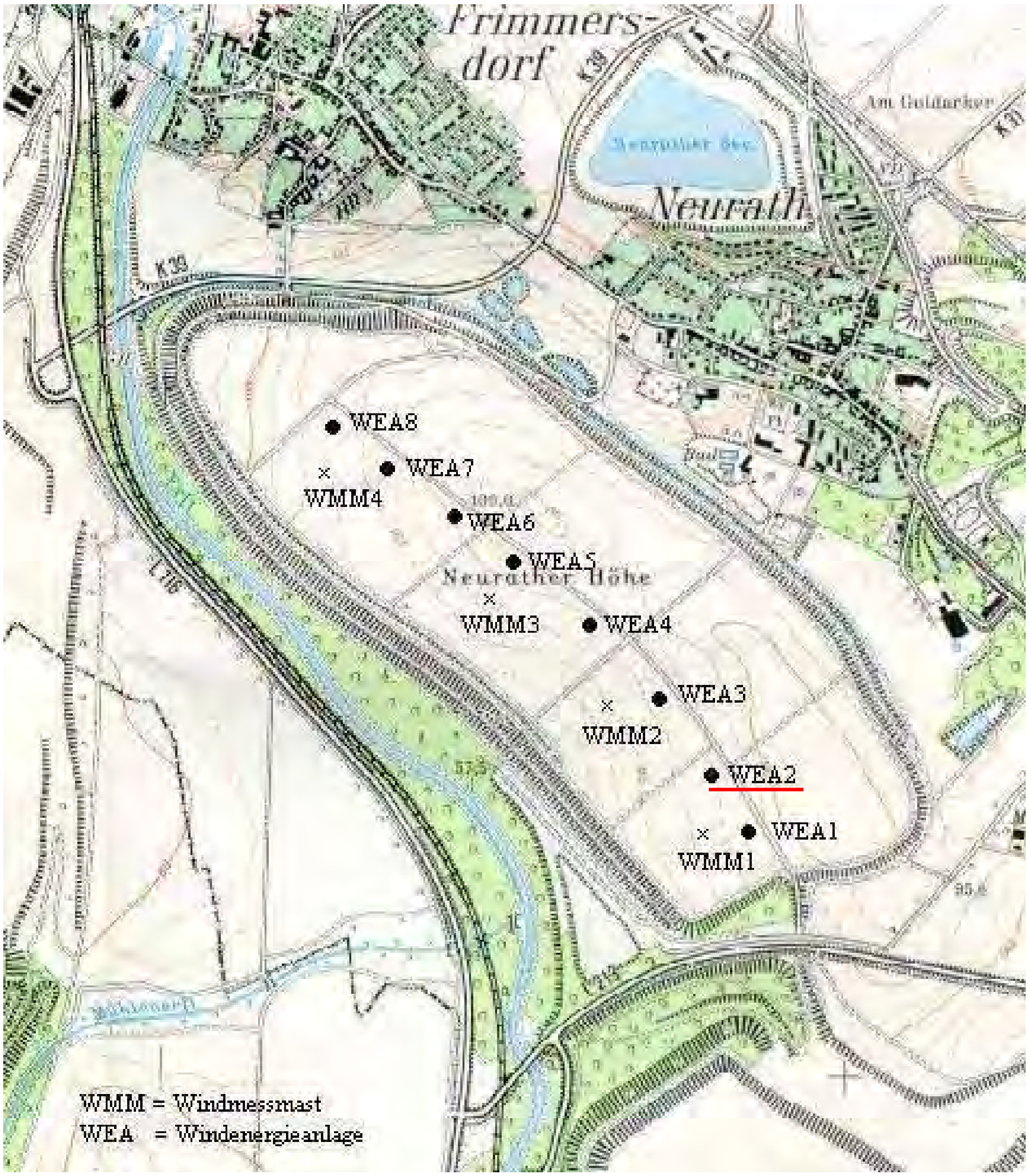
[3] Technische Richtlinien für Windenergieanlagen, Revision 17, Stand 01.07.2006 Teil1: Bestimmung der Schallemissionswerte, Herausgeber: Fördergesellschaft Windenergie e. V., Stresemannplatz 4, 24103 Kiel

7 Abbreviations

ΔL	-	level difference	dB
$\Delta L_{a,k}$	-	tonal audibility	dB
BG	-	operating noise	-
D	-	rotor diameter	m
f_T	-	tonal frequency	Hz
H	-	hub height	m
h_A	-	height of measuring microphone	m
HG	-	background noise	-
κ	-	correction factor	-
L_{Aeq}	-	equivalent, A-weighted continuous sound pressure level	dB
$L_{Aeq,c}$	-	background corrected sound pressure level	dB
$L_{Aeq,mess}$	-	measured sound pressure level	dB
$L_{Aeq,regr}$	-	calculated sound pressure level	dB
L_T	-	tone level	dB
L_{WA}	-	A-weighted sound power level	dB
N	-	number of values	-
N_A	-	horizontal distance between rotor centre and tower centre	m
P	-	electrical power	kW
R_0	-	horizontal distance between WEC and sound proof board	m
R_i	-	radius of cover surface	m
U_a, U_b, U_c	-	measurement uncertainties	dB

8 Appendix

Appendix 1	Location
Appendix 2	Manufacturer's specification
Appendix 3	Power curve
Appendix 4	Raw data
Appendix 5	Octave spectra
Appendix 6	Narrow band spectra



The measured turbine is the WEC no. 2

Herstellerbescheinigung zu spezifischen Daten des Anlagentypes: VENSYS 77
Manufacturer's certificate on specific data of the type of installation: VENSYS 77

Datum / date: 03/12/2007

1. Allgemeines		**General**
Hersteller	VENSYS EnergyAG	manufacturer
Anlagenbezeichnung	VENSYS 77	type name
Art (horizontal/vertikal)	horizontal	type (horizontal / vertical)
Nennleistung	1500 kW	rated power
Leistungsregelung	pitch	power control
Nabenhöhe über Fundament	83.0 m	hub height above foundation
Nabenhöhe über Grund	85.0 m	hub height above ground
Nennwindgeschwindigkeit	13.0 m/s	rated wind speed
Ein- und Abschaltwindgeschwindigkeit	3.0 m/s/ 22.0 m/s	cut-in and cut-out wind speed
Überlebenswindgeschwindigkeit	52.5 m/s	survival wind speed
Rechnerische Lebensdauer	20 Jahre / years	calculated safe life
Beitrag zum Kurzschlußstrom	1.4 kA	contribution to short circuit current
2. Rotor		**Rotor**
Durchmesser	76.84 m	diameter
Bestrichene Fläche	4637 m²	swept area
Anzahl der Blätter	3	number of blades
Nabenart (pendelnd/starr)	starr / rigid	kind of hub
Anordnung zum Turm (luv/lee)	luv / upwind	relative position to tower (luv/lee)
Nenndrehzahl / -bereich	17.3 / 9.0…17.3 rpm	rated speed
Auslegungsschnellaufzahl	8.5	design tip speed ratio
Rotorblatteinstellwinkel	1.0 °	rotor blade pitch setting
Konuswinkel	3.0 °	cone angle
Achsneigung	3.0 °	tilt angle
Abstand Rotorflanschmittelpunkt - Turmmittellinie	3915 mm	distance between rotor flange centre - tower centre line
3. Rotorblatt		**Rotor blade**
Hersteller	LM Glasfiber	manufacturer
Typenbezeichnung	LM 37.3p2	type
Profile innen	FX	blade section inside
Profile aussen	NACA	blade section outside
Material	GfK	material
Länge	37.3 m	length
Profiltiefe max/min	3.1 m/ 0.38 m	chord length (max/min)
Zusatzkomponenten (z.B. stall strips, Vortex-Generatorn, Turbolatoren)	Vortex Generators	additional components (e.g. stall strips, vortex generators, trip strips)
Extenderlänge	-.m	Extender length
4. Getriebe		**Gear**
Hersteller	getriebelos /	manufacturer
Typenbezeichnung	gearless	type
Ausführung	-	design
Übersetzungsverhältnis	-	gear ratio
5. Generator		**Generator**
Hersteller	VENSYS	manufacturer
Typenbezeichnung	VS1500_88BLW	type
Anzahl	1	numbers
Art	synchron	design
Nennleistung(en)	1580 kW	rated power(s)
Nennscheinleistung	1580 kVA	rated apparent power
Nenndrehzahlen oder Drehzahlbereich	9.0 – 17.3 rpm	rated speed(s) / speed range
Spannung	690 V	voltage
Frequenz	12.7 Hz	frequency
Nennschlupf	- %	rated slip
6. Turm		**Tower**
Hersteller	SIAG	manufacturer
Typenbezeichnung	VENSYS 85m	type
Ausführung (Gitter/Rohr, zyl./kon.)	Rohr / tube, cyl.	design (tapered/tube, cylin./lattice)
Material	Stahl / steel	material
Länge	81.8 m	length
7. Windrichtungsnachführung		**Yaw orientation drive**
Ausführung (aktiv/passiv)	Aktiv / active	design (active/passive)
Antriebsart (el./mech./hydr.)	electric	drive (electr./mech./hydr.)
Dämpfungssystem während des Betriebs	-	damping system during operation

8. Betriebsführung / Regelung		Supervisory system/control
Art der Leistungsregelung	pitch	kind of power control
Antrieb der Leistungsregelung	electric	driver of power control
Automatischer Wiederanlauf		automatic restart
- nach Netzausfall	yes	- following grid-failure
- nach Abschaltwind	yes	- following cut-out wind speed
Hersteller der Betriebsführung / Regelung	VENSYS	manufacturer of control system
- Typenbezeichnung	VENSYS 70/77	- type
- Verwendete Steuerungskurve	-	- used control curve

9. Sonstige elektrische Komponenten		Other electric installations
Anzahl der Kompensationsstufen	-	number of compensation stages
Blindleistung Stufe 1	-	reactive power stage 1
Blindleistung Stufe 2	-	reactive power stage 2
Blindleistung Stufe 3	-	reactive power stage 3
Blindleistung Stufe 4	-	reactive power stage 4
Art der Netzkopplung	Frequency converter	kind of interconnection
- Hersteller	VENSYS	- manufacturer
- Typenbezeichnung	VS 1500H	- type
Netzschutzhersteller	Siemens	mains protective manufacturer
- Typenbezeichnung	3WL1220-2BB32	- type
- Einstellbereiche:	1470 A	- adjustment range:
Spannungssteigerungsschutz	111 %, 1 s %, ms %, ms	overvoltage protection
Spannungsrückgangsschutz	89 %, 1 s %, ms %, ms	undervoltage protection
Frequenzsteigerungsschutz	110 %, 100 ms	overfrequency protection
Frequenzrückgangsschutz	90 %, 100 ms	underfrequency protection
Typenbezeichnung der Abschalteinheit	3WL1220-2BB32	type of contact breaking device
Oberschwingungsfilter (Ja/Nein)	Ja / Yes	harmonic filter /yes,no)
Oberschwingungsfilter müssen auf den Netzverknüpfungspunkt ausgelegt sein.)	Nein / No	(harmonic filter have to be designed fotr the point of common coupling)

10. Bremssystem		Brake system
Bremssystem (primär/sekundär)	pitch / pitch	brakes (primary/secondary/service)
- Aktivierung	active	- Activation
- Anordnung		- Location
- Bremsenart		- Kind
- Betätigung	- / - / -	- Operation

11. Typenprüfung		Type test
Prüfbehörde	TÜV Nord	testing authority
Aktenzeichen		reference

12. Informativer Teil		Informative
Standort der vermessenen WEA	Grevenbroich	location of measured WTGs
Koordinaten des Standortes	2541 584 / 5654 905	coordinate of the location
Seriennummer der WEA	V001	serial number of WTGs
der Blätter	3744./.3749./. 3755-lm37.3p2	blades
des Getriebes	-	gearbox
des Generators	VS1500_88BLW-001	generator

VENSYS Energy AG
Saar-Lor-Lux-Str. ... Saarbrücken
Tel: +49(0)681 970430 · Fax: +49(0)681 9704311

Stempel und Unterschrift des Herstellers
stamp and signature of the manufacturer

Der Hersteller der Windenergieanlage bestätigt, dass die WEA, deren Schallemission, Leistungskurve und elektrischen Eigenschaften in den Prüfberichten abgebildet ist, hinsichtlich ihrer technischen Daten mit den o.g. Positionen identisch ist.

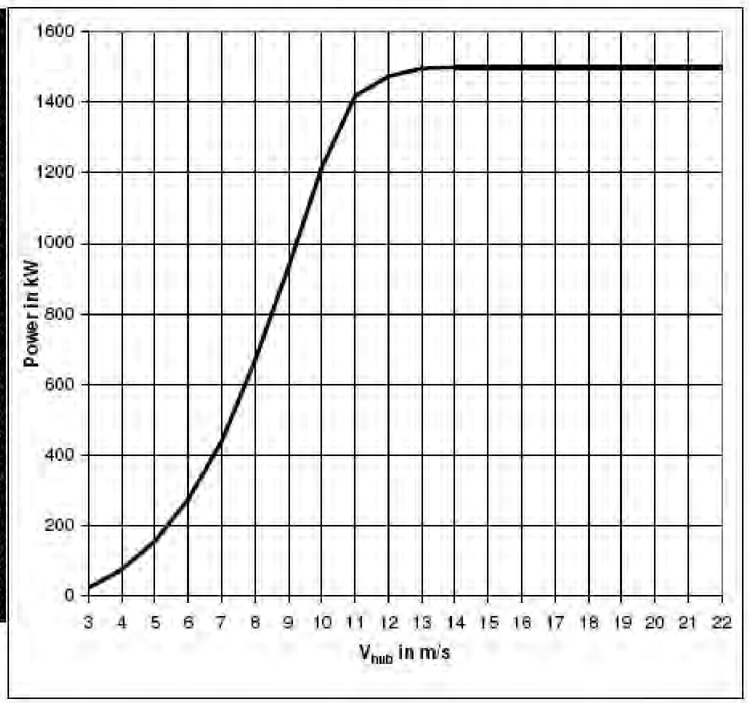
The manufacturer of the wind turbine generator system (WTGs) confirms that the WTGS whose noise level, performance curve and power quality is measured and depicted in the test reports is identical with the above entries with regard to is technical data.

VENSYS Energiesysteme GmbH & Co. KG

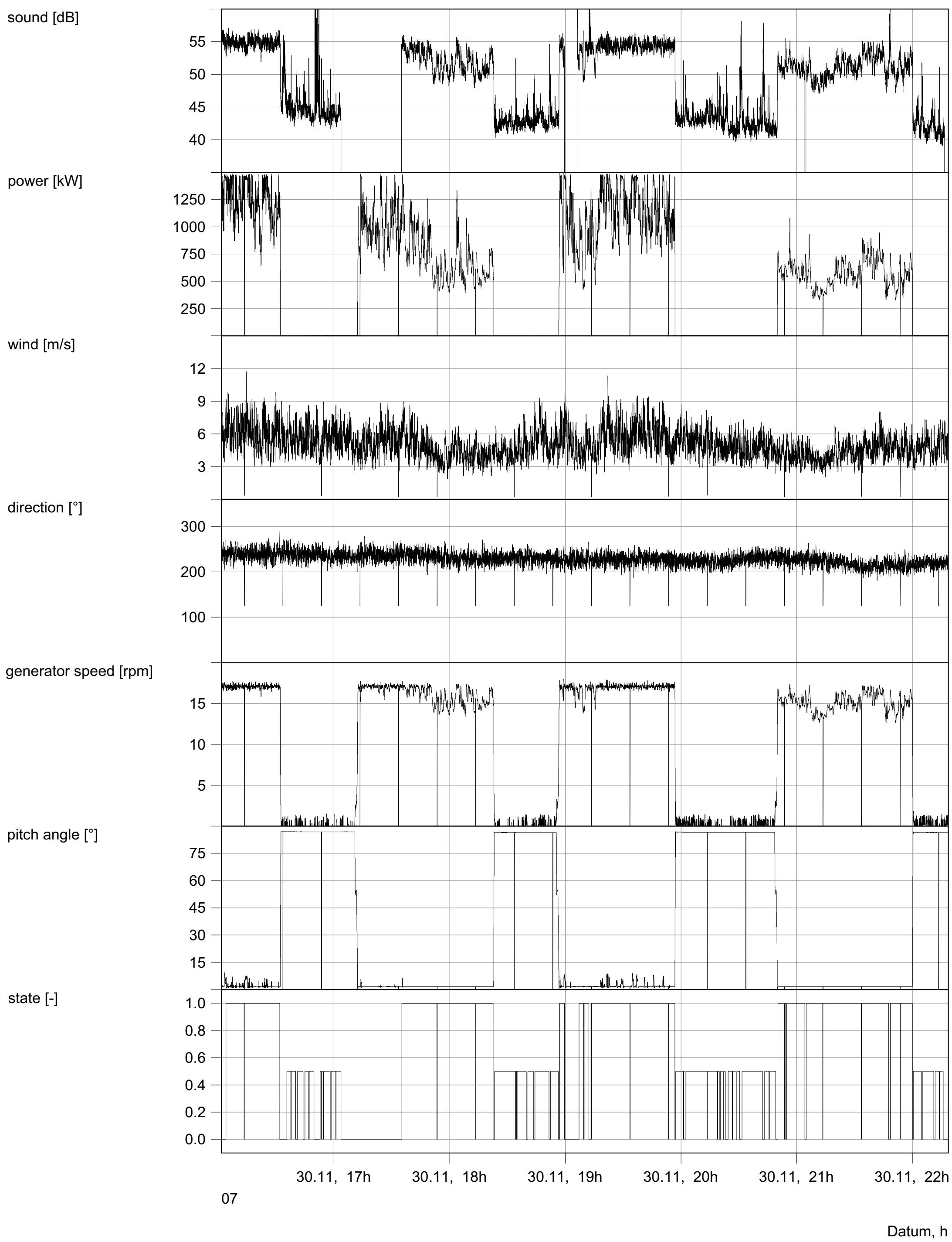
Berechnete Leistungskennlinie
Calculated Power Curve

Datum/Date:	14.12.2004
Anlagentyp/Turbine:	VENSYS 77
Nennleistung/Rated power:	1500 kW
Einschaltgeschwindigkeit/Cut-in wind speed:	3.0 m/s
Abschaltgeschwindigkeit/Cut-out wind speed:	22.0 m/s
Windgeschw. in Nabenhöhe/Wind speed at hub height:	(10 min Mittelwert/average)
Rotorblatt/Rotor blade:	LM37.3p
Rotordurchmesser/Rotor diameter	77.0 m
Luftdichte/Air density:	1.225 kg/m^3
Turbulenzintensität/Turbulence intensity:	10% const.
Windrichtung/Wind direction:	0°
Höhenwindexponent/Wind shear exponent:	0.16

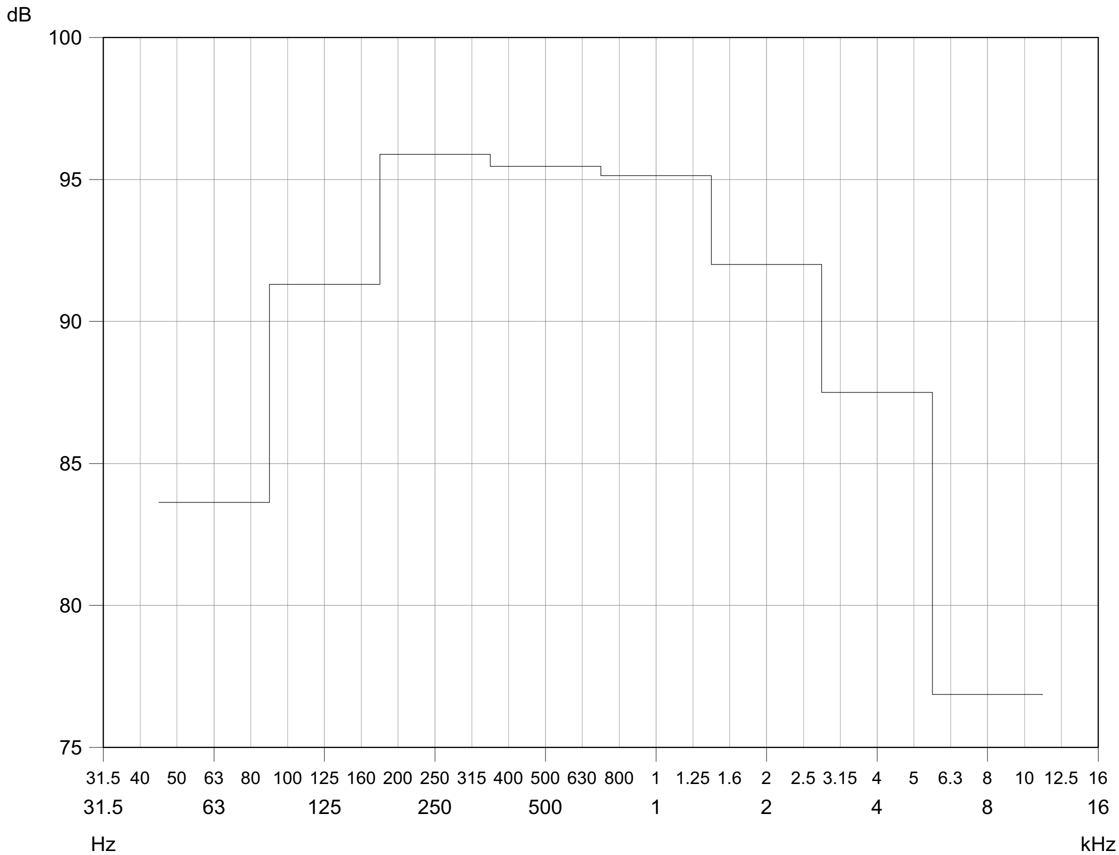
V_{hub}[m/s]	Leistung/Power in kW
3	21.9
4	75.1
5	155.8
6	274.3
7	439.3
8	668.0
9	932.1
10	1215.4
11	1418.2
12	1473.7
13	1496.5
14	1500.0
15	1500.0
16	1500.0
17	1500.0
18	1500.0
19	1500.0
20	1500.0
21	1500.0
22	1500.0



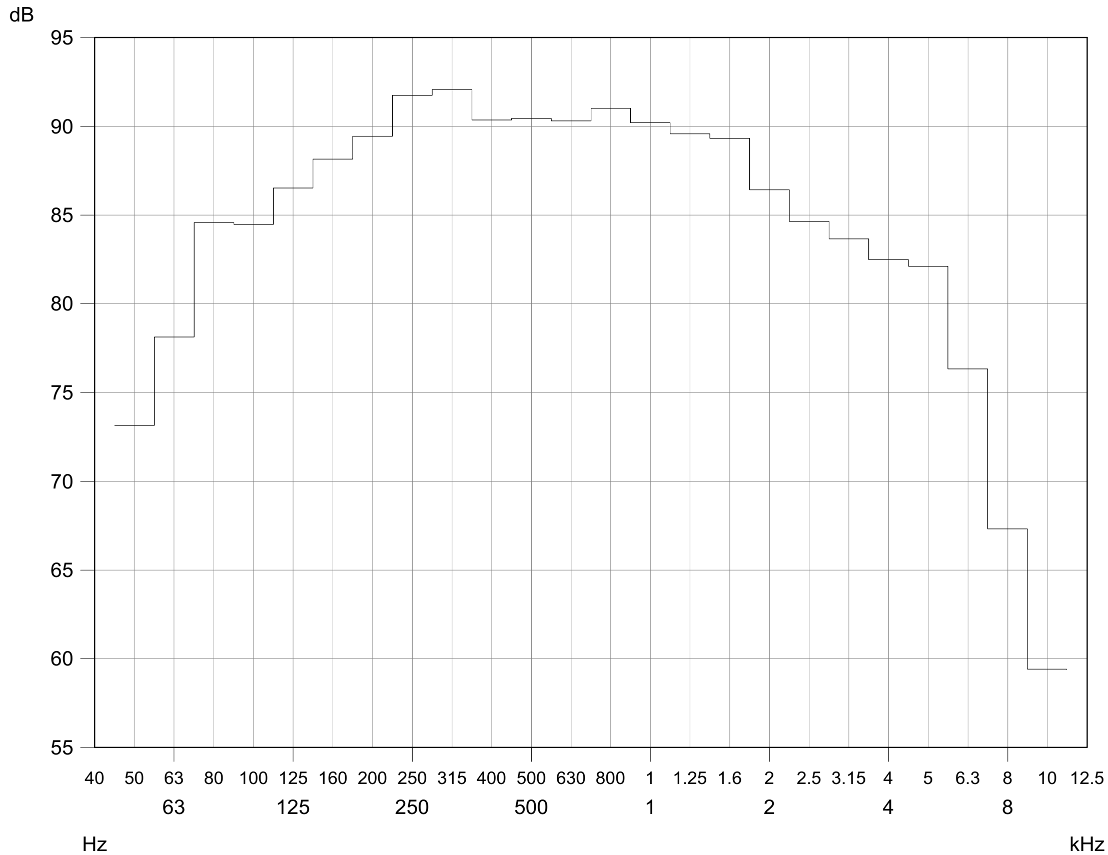
technische Änderungen vorbehalten / subject to technical modifications



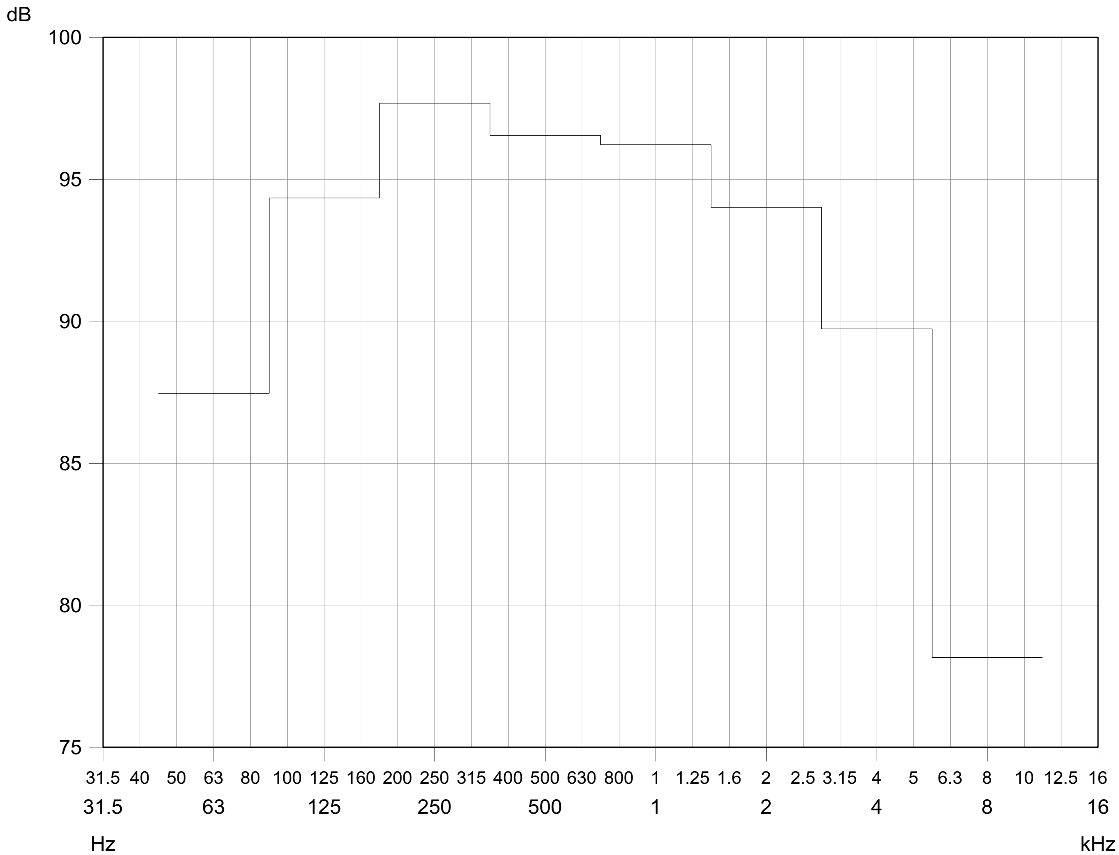
Measurement data 2007-11-30



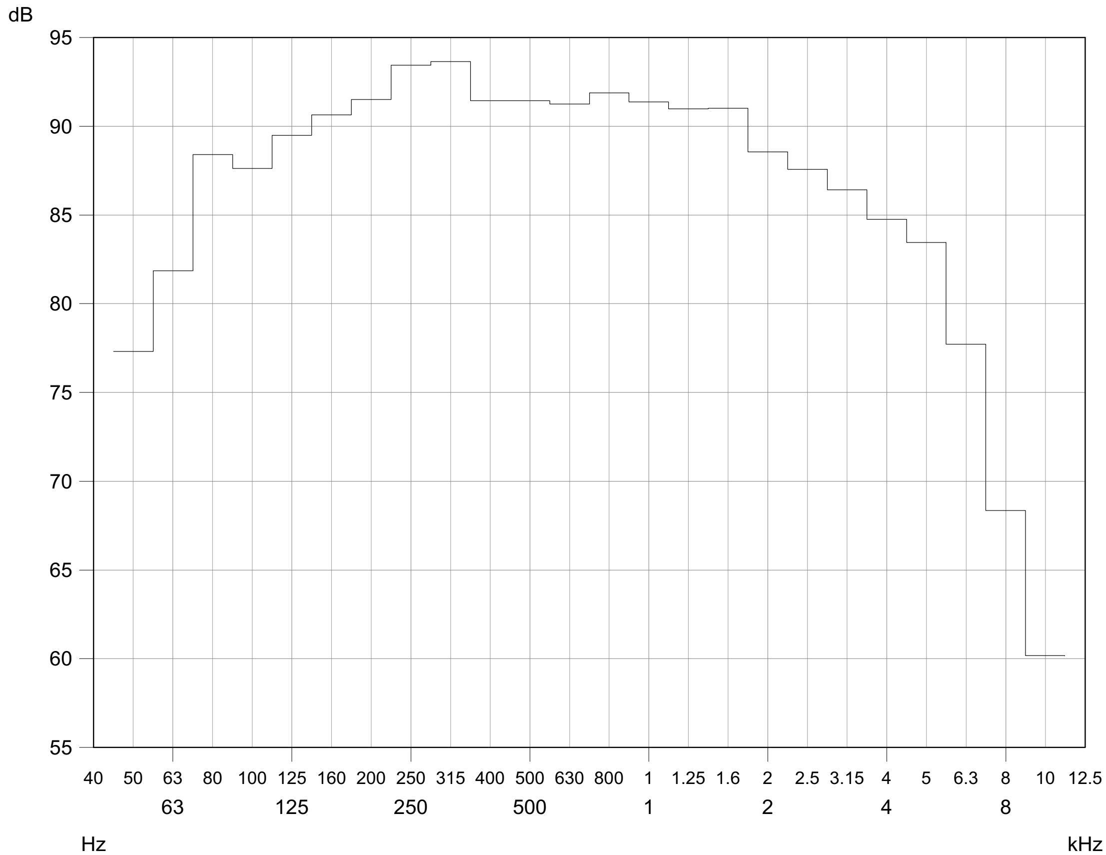
Octave sound power level at 6 m/s, sum level = 101,6 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
63	83,63	1000	95,14
125	91,31	2000	92
250	95,9	4000	87,5
500	95,47	8000	76,86



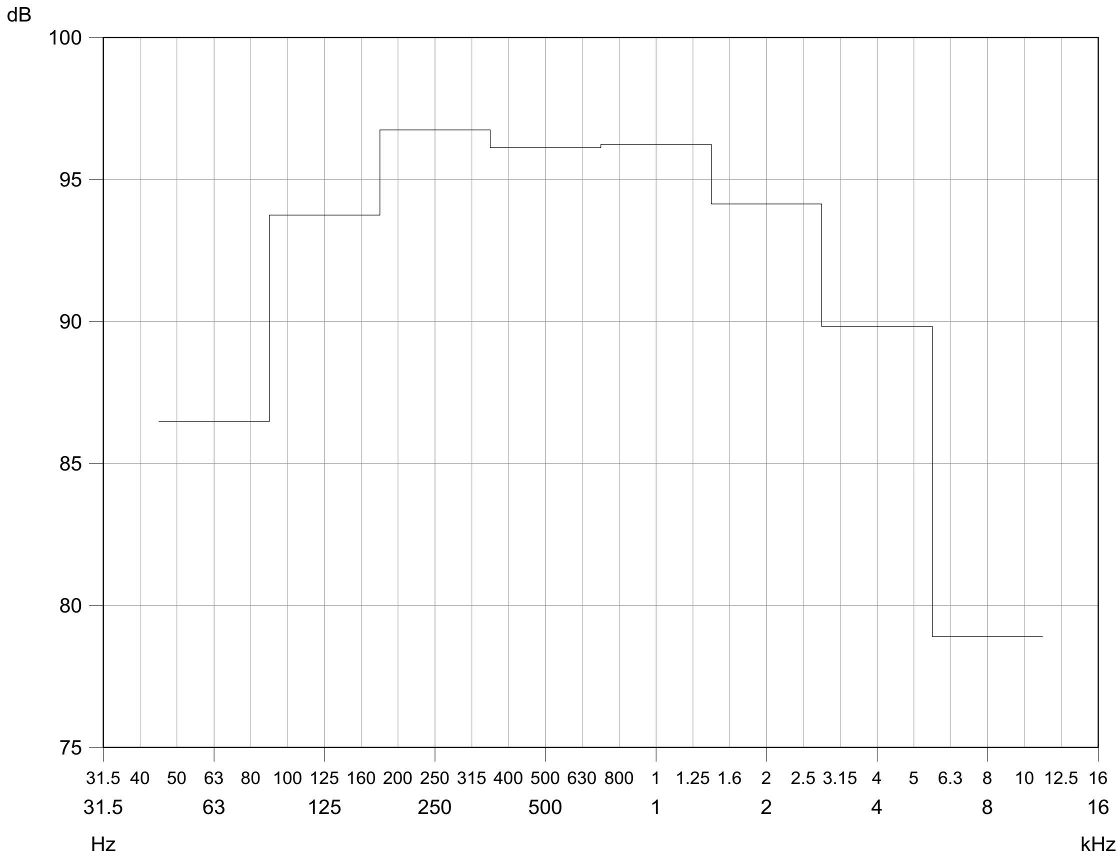
Third octave sound power level at 6 m/s, sum level = 101,6 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
50	73,15	800	91,02
63	78,12	1000	90,21
80	84,57	1250	89,58
100	84,47	1600	89,33
125	86,52	2000	86,43
160	88,17	2500	84,65
200	89,45	3150	83,66
250	91,75	4000	82,49
315	92,08	5000	82,12
400	90,36	6300	76,32
500	90,46	8000	67,3
630	90,32	10000	59,39



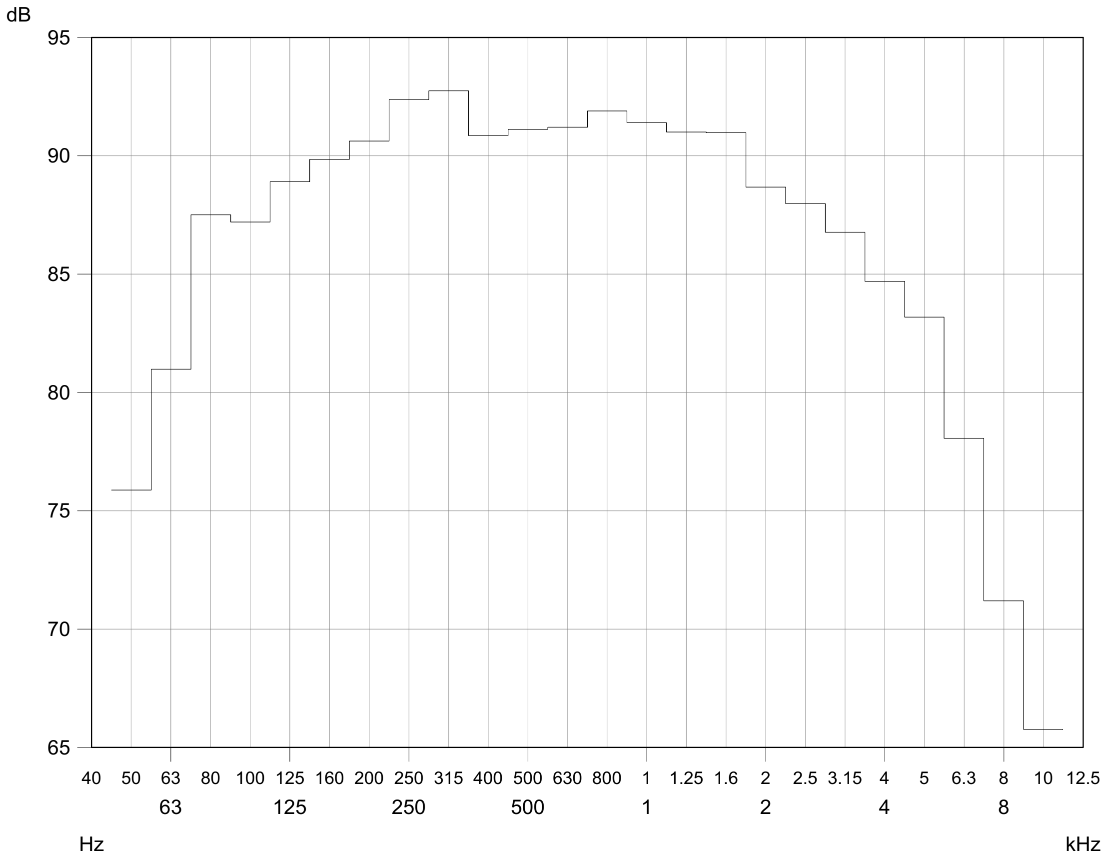
Octave sound power level at 7 m/s, sum level = 103,3 dB			
Oktavmittenfrequenz [Hz]	Schallleistungspegel [dB]	Oktavmittenfrequenz [Hz]	Schallleistungspegel [dB]
63	87,46	1000	96,23
125	94,35	2000	94,01
250	97,68	4000	89,72
500	96,55	8000	78,15



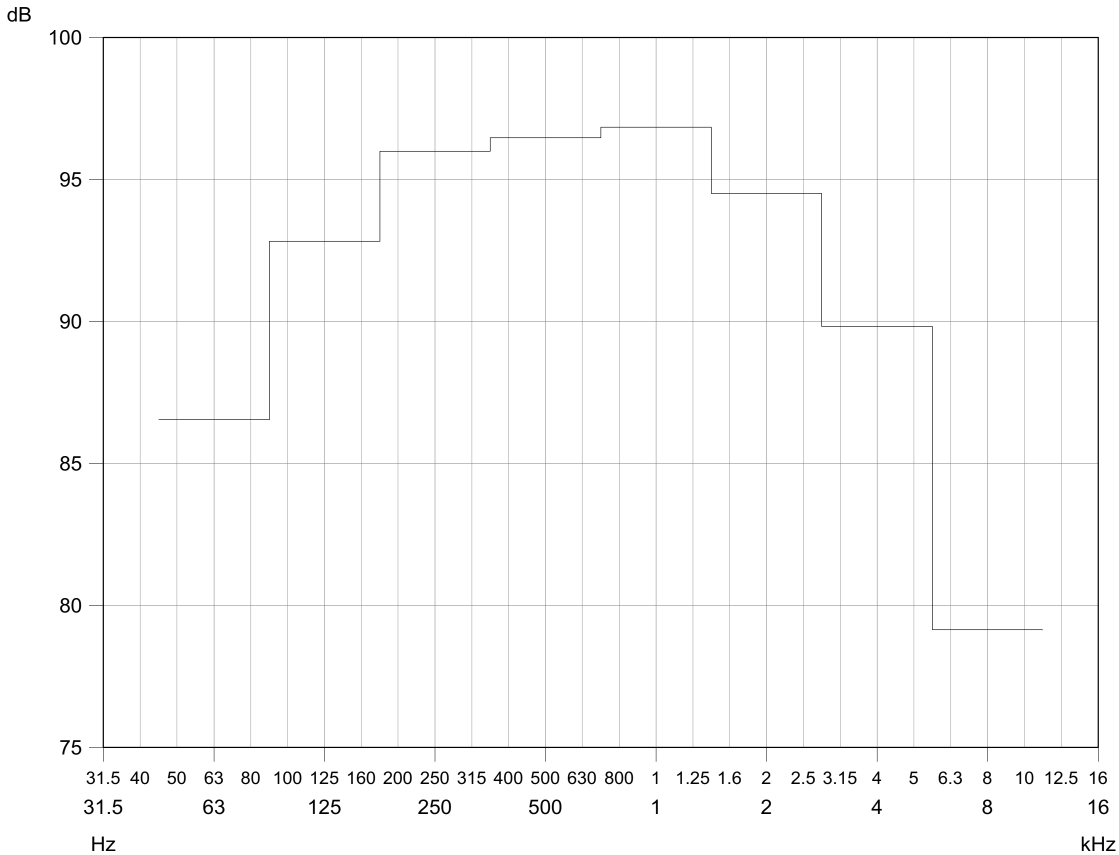
Third octave sound power level at 7 m/s, sum level = 103,3 dB			
Terzmittenfrequenz [Hz]	Schallleistungspegel [dB]	Terzmittenfrequenz [Hz]	Schallleistungspegel [dB]
50	77,31	800	91,89
63	81,86	1000	91,39
80	88,41	1250	90,99
100	87,63	1600	91,02
125	89,5	2000	88,56
160	90,65	2500	87,57
200	91,51	3150	86,42
250	93,46	4000	84,76
315	93,66	5000	83,46
400	91,45	6300	77,71
500	91,45	8000	68,35
630	91,27	10000	60,17



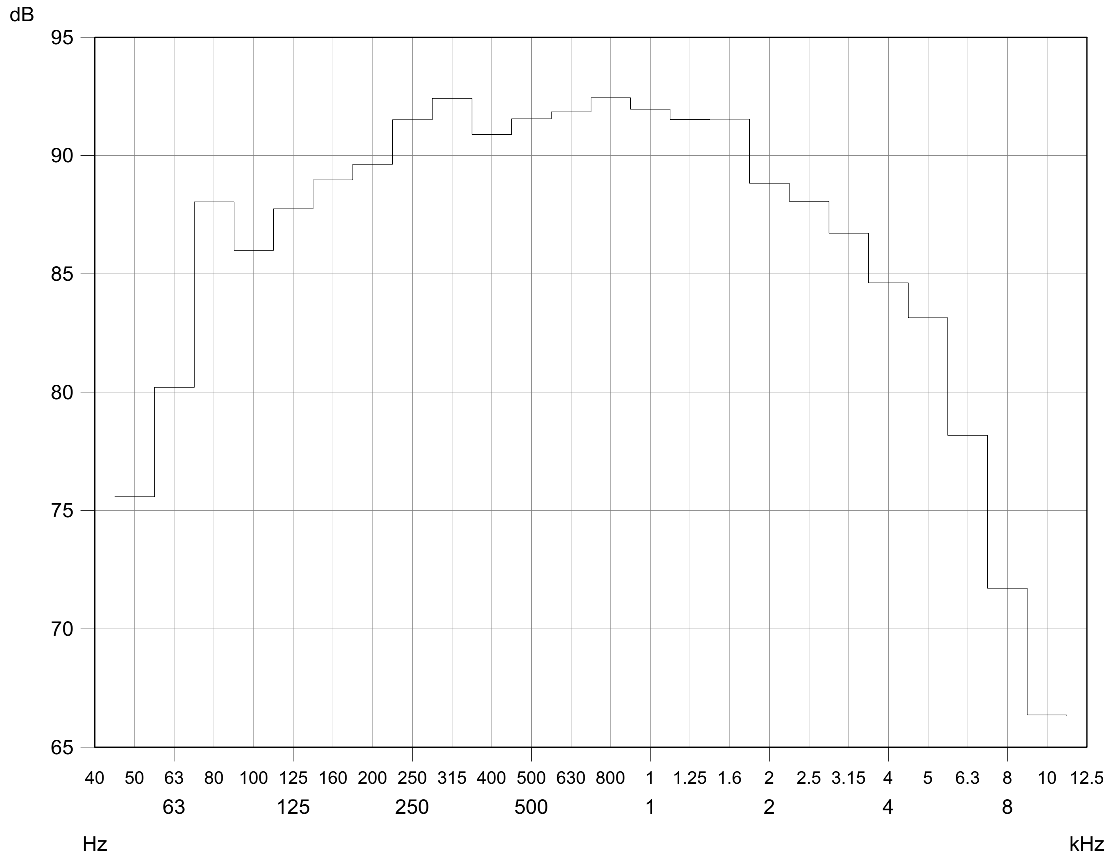
Octave sound power level at 8 m/s, sum level = 102,9 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
63	86,48	1000	96,25
125	93,75	2000	94,14
250	96,75	4000	89,83
500	96,13	8000	78,89



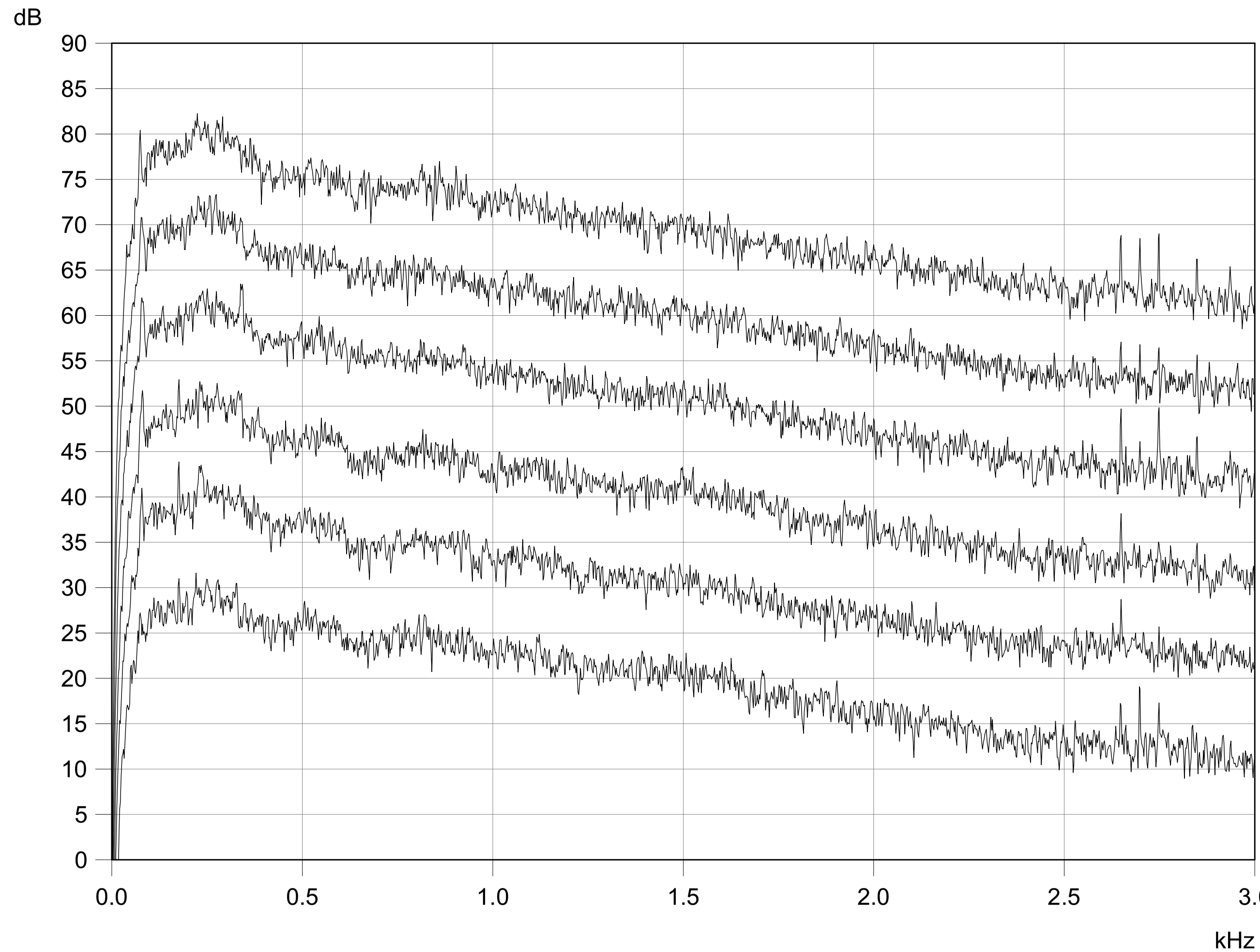
Third octave sound power level at 8 m/s, sum level = 102,9dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
50	75,88	800	91,9
63	80,98	1000	91,4
80	87,52	1250	91,01
100	87,21	1600	90,99
125	88,91	2000	88,69
160	89,86	2500	87,99
200	90,63	3150	86,78
250	92,39	4000	84,7
315	92,76	5000	83,19
400	90,86	6300	78,06
500	91,12	8000	71,18
630	91,22	10000	65,75



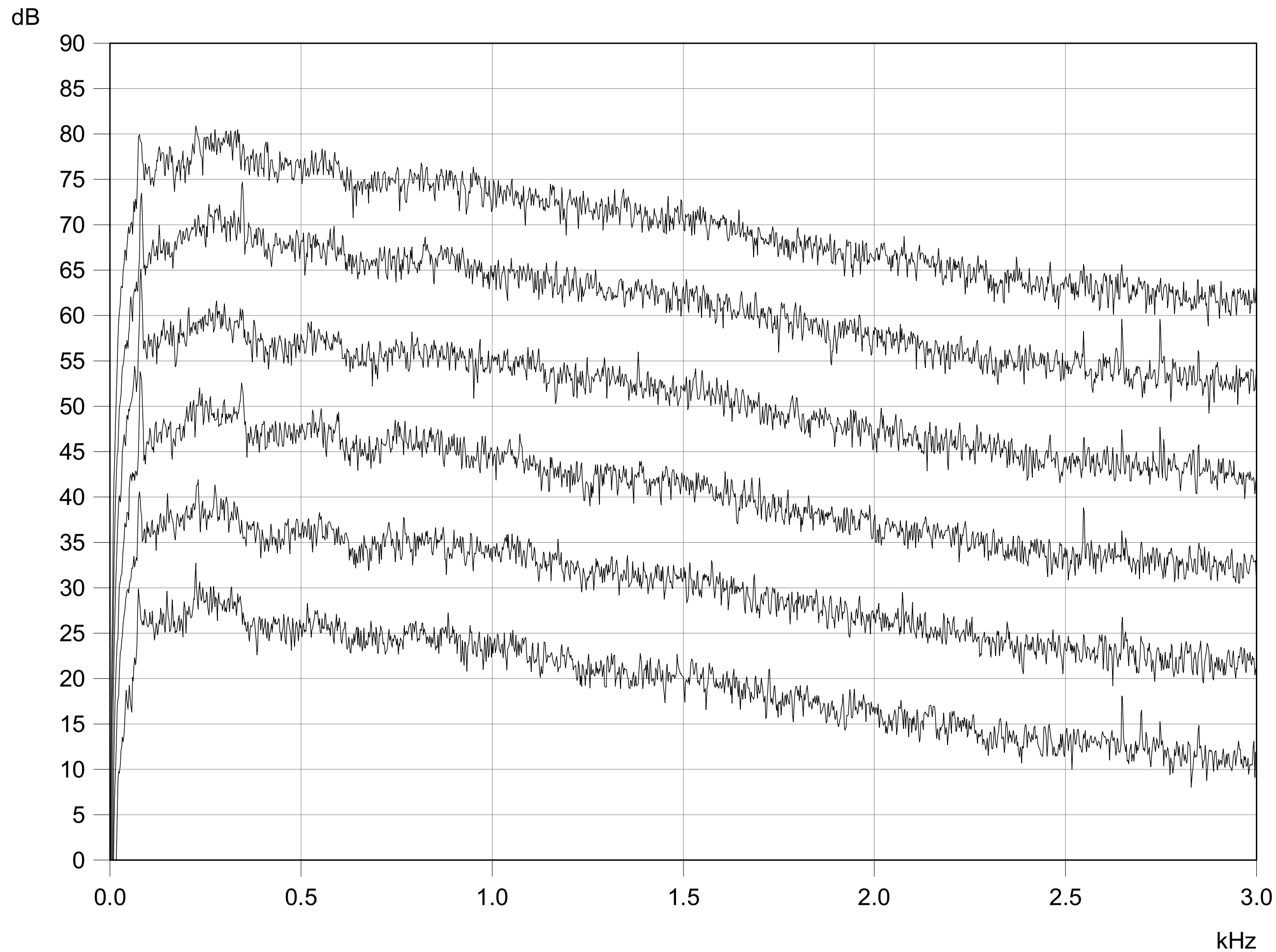
Octave sound power level at 9 m/s, sum level < 102,9 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
63	86,54	1000	96,85
125	92,83	2000	94,51
250	96	4000	89,83
500	96,48	8000	79,14



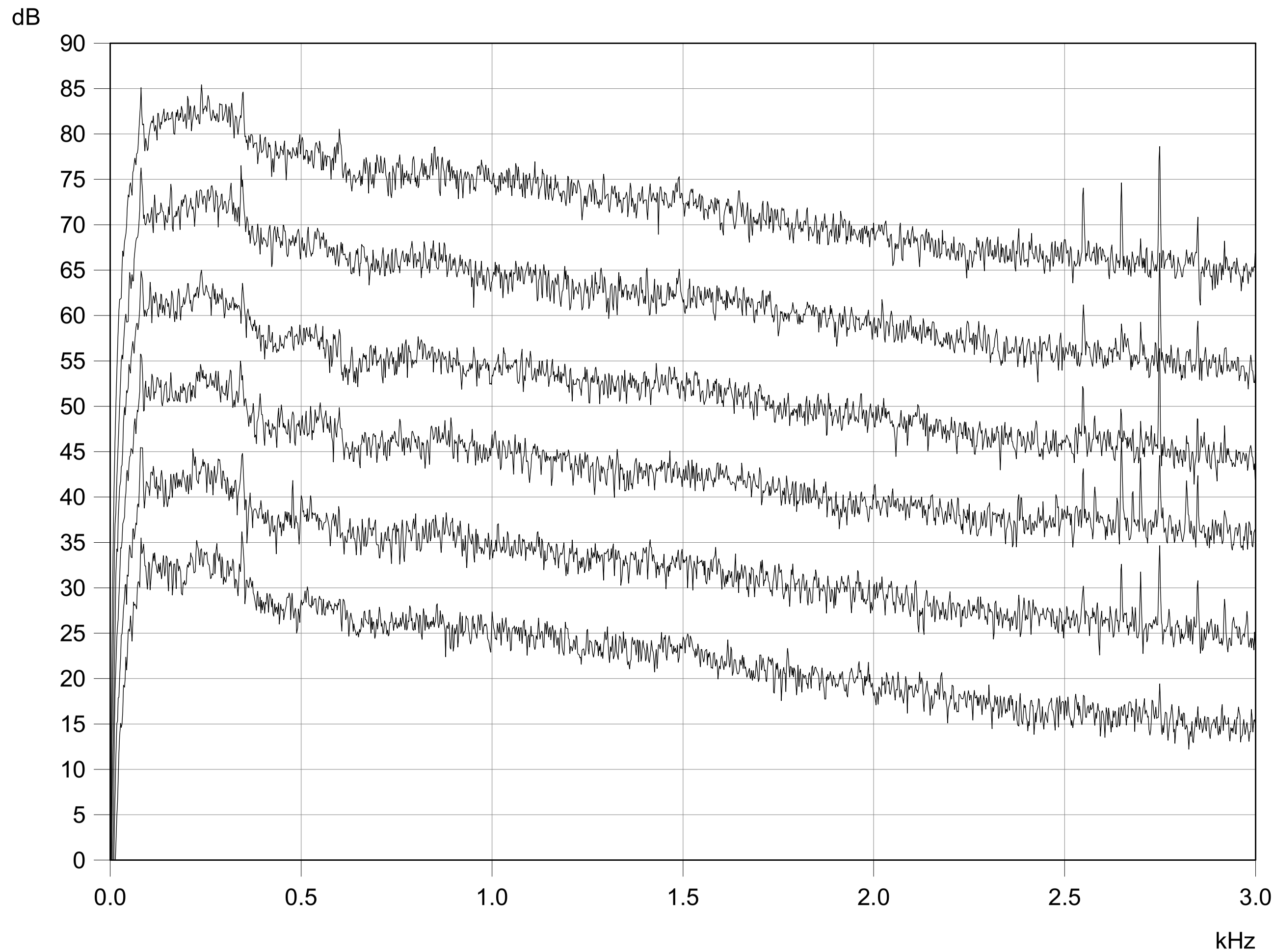
Third octave sound power level at 9 m/s, sum level < 102,9dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
50	75,58	800	92,46
63	80,2	1000	91,97
80	88,04	1250	91,54
100	86	1600	91,55
125	87,76	2000	88,84
160	88,98	2500	88,07
200	89,64	3150	86,72
250	91,52	4000	84,62
315	92,43	5000	83,14
400	90,9	6300	78,18
500	91,56	8000	71,71
630	91,85	10000	66,35



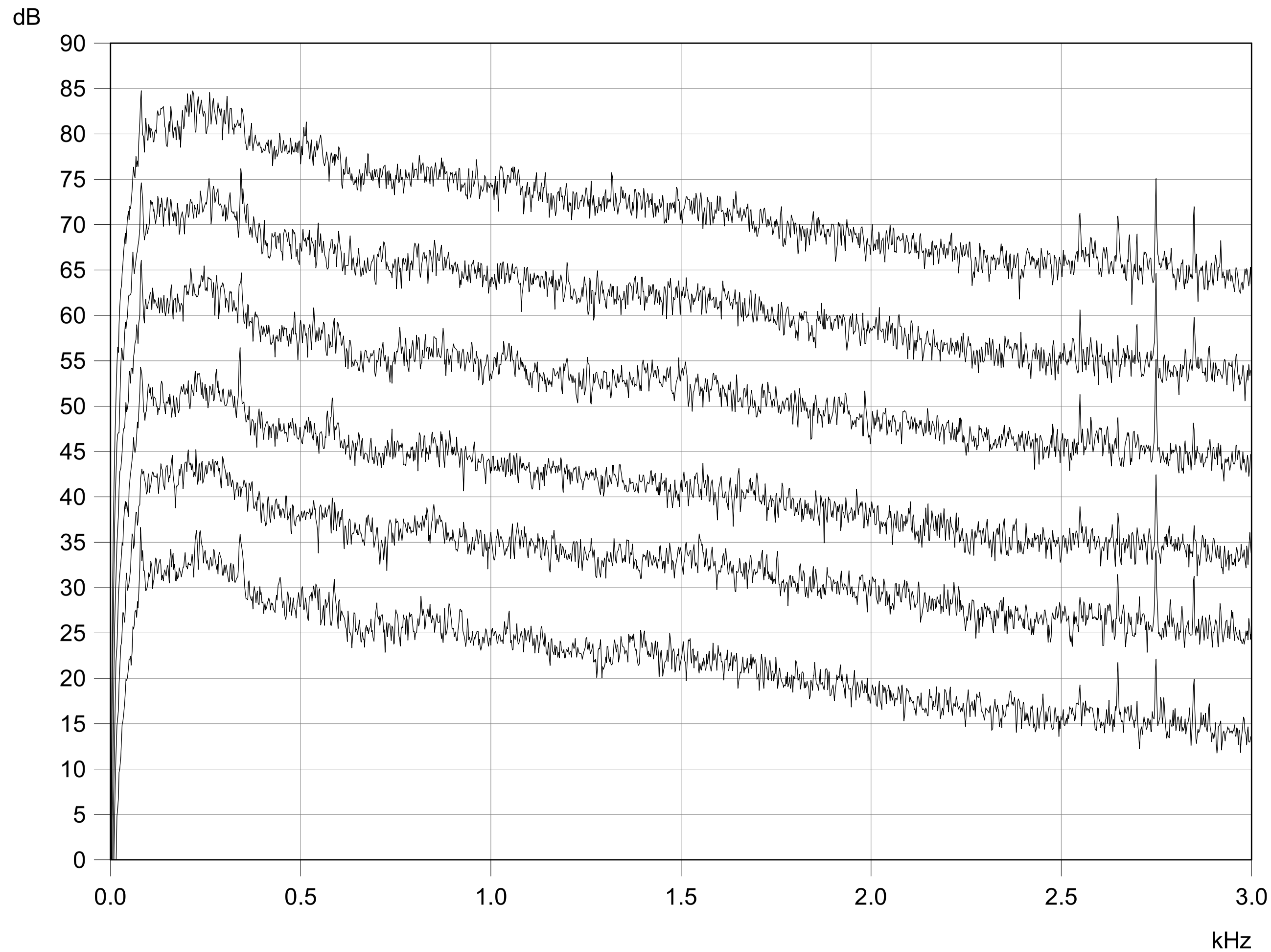
Spectra 1 – 6, at 6 m/s (upper spectra shifted by 10 dB each, no. 1 at top)



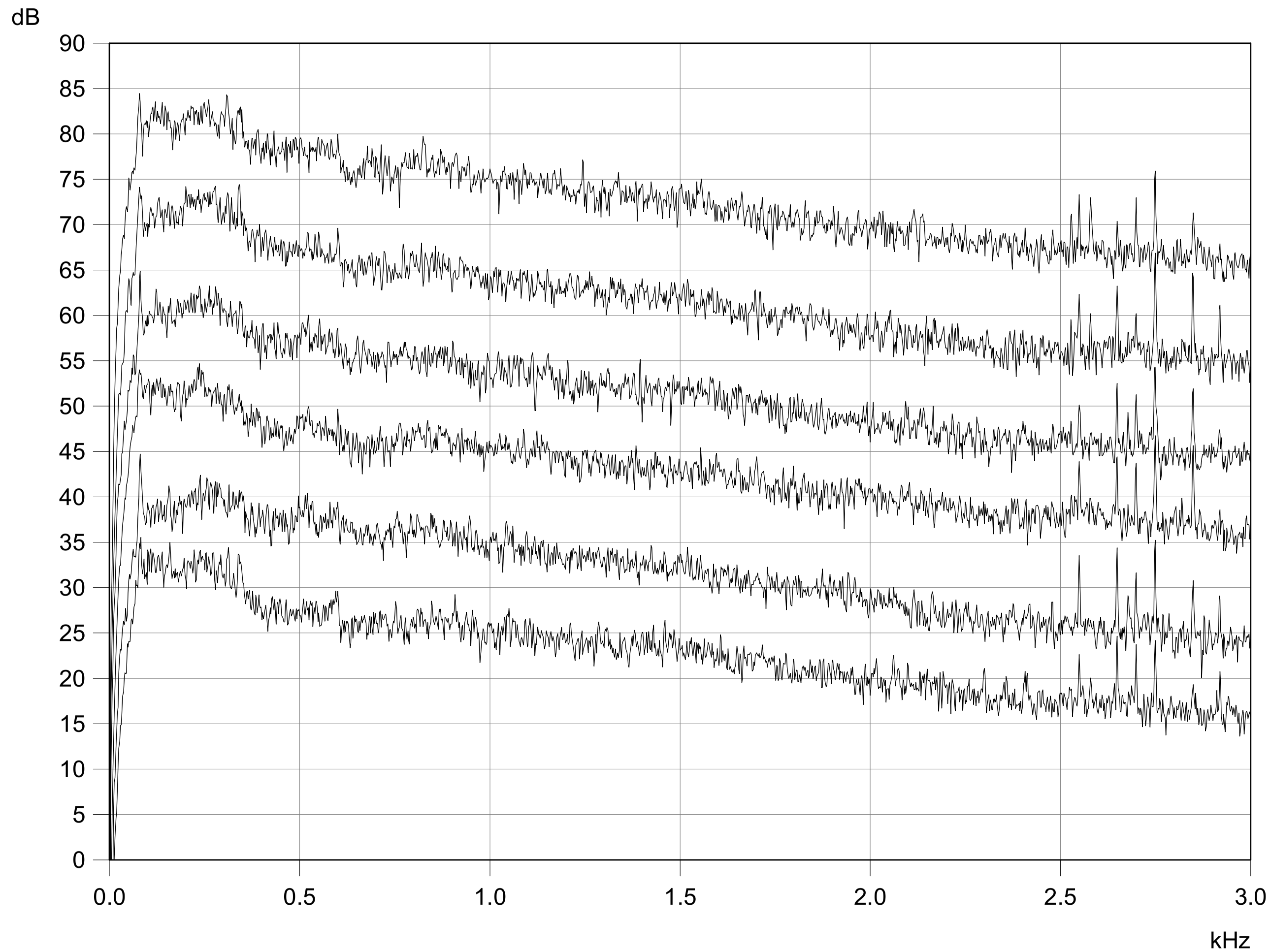
Spectra 7 – 12, at 6 m/s



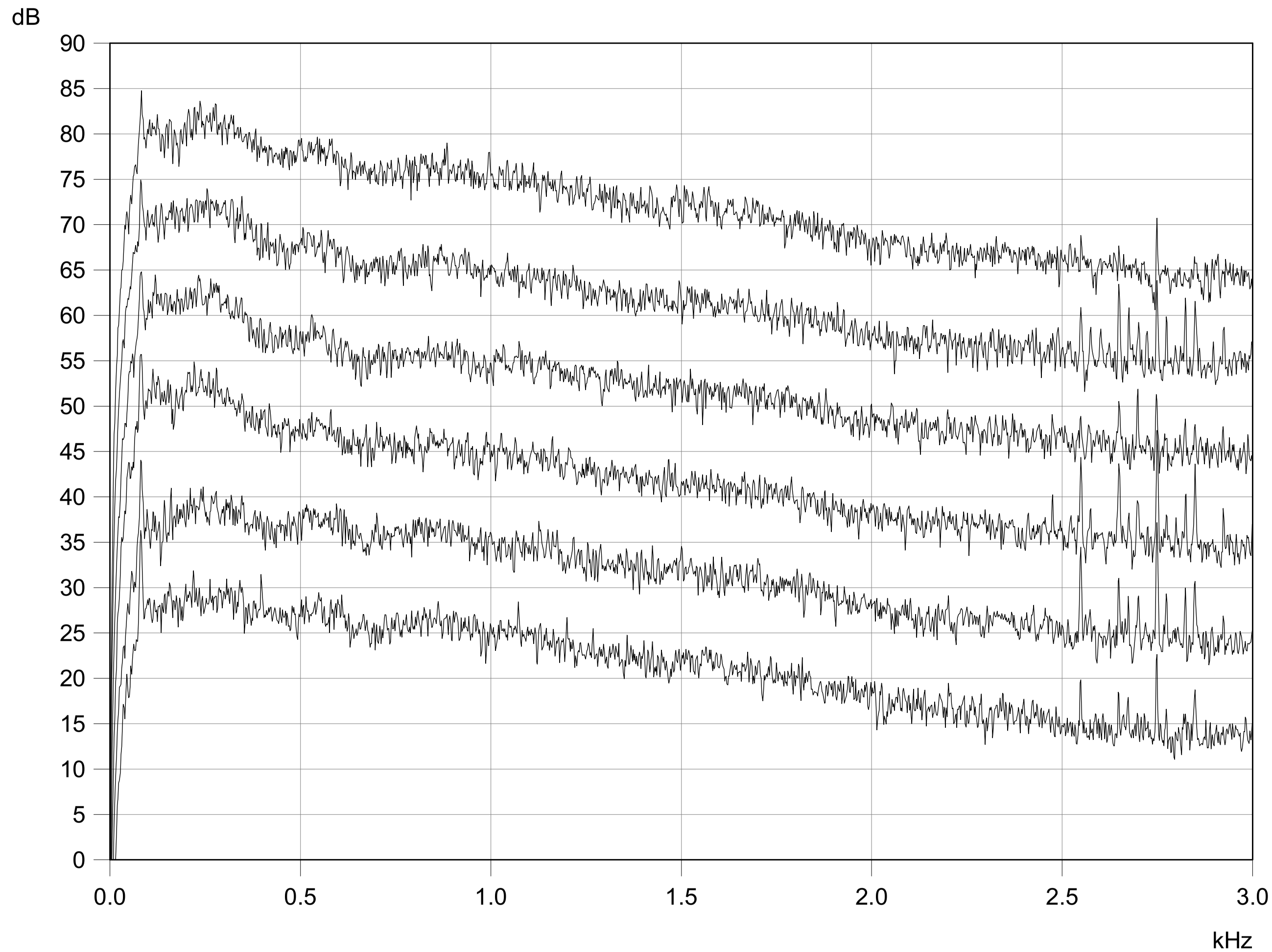
Spectra 1 – 6, at 7 m/s



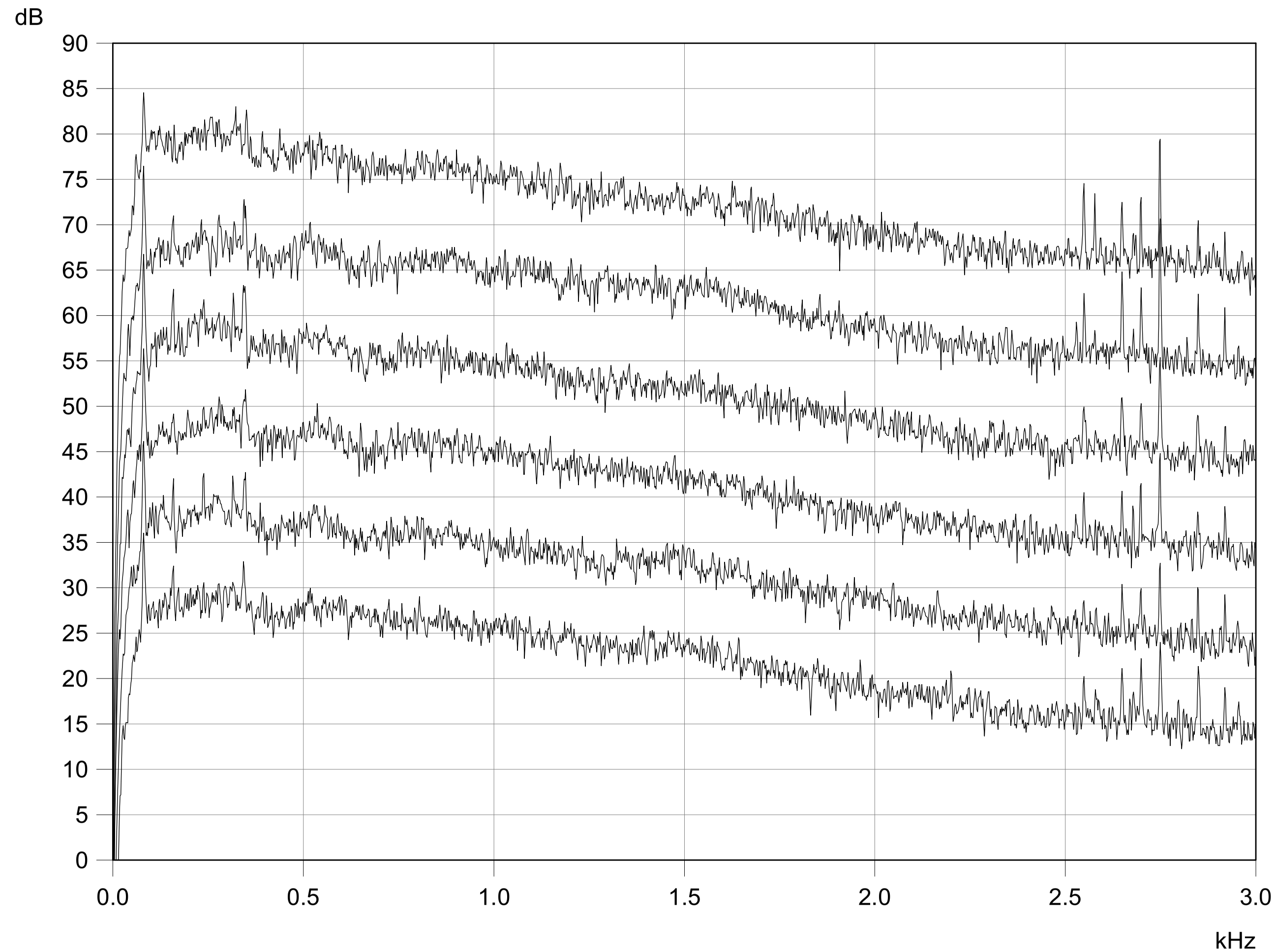
Spectra 7 – 12, at 7 m/s



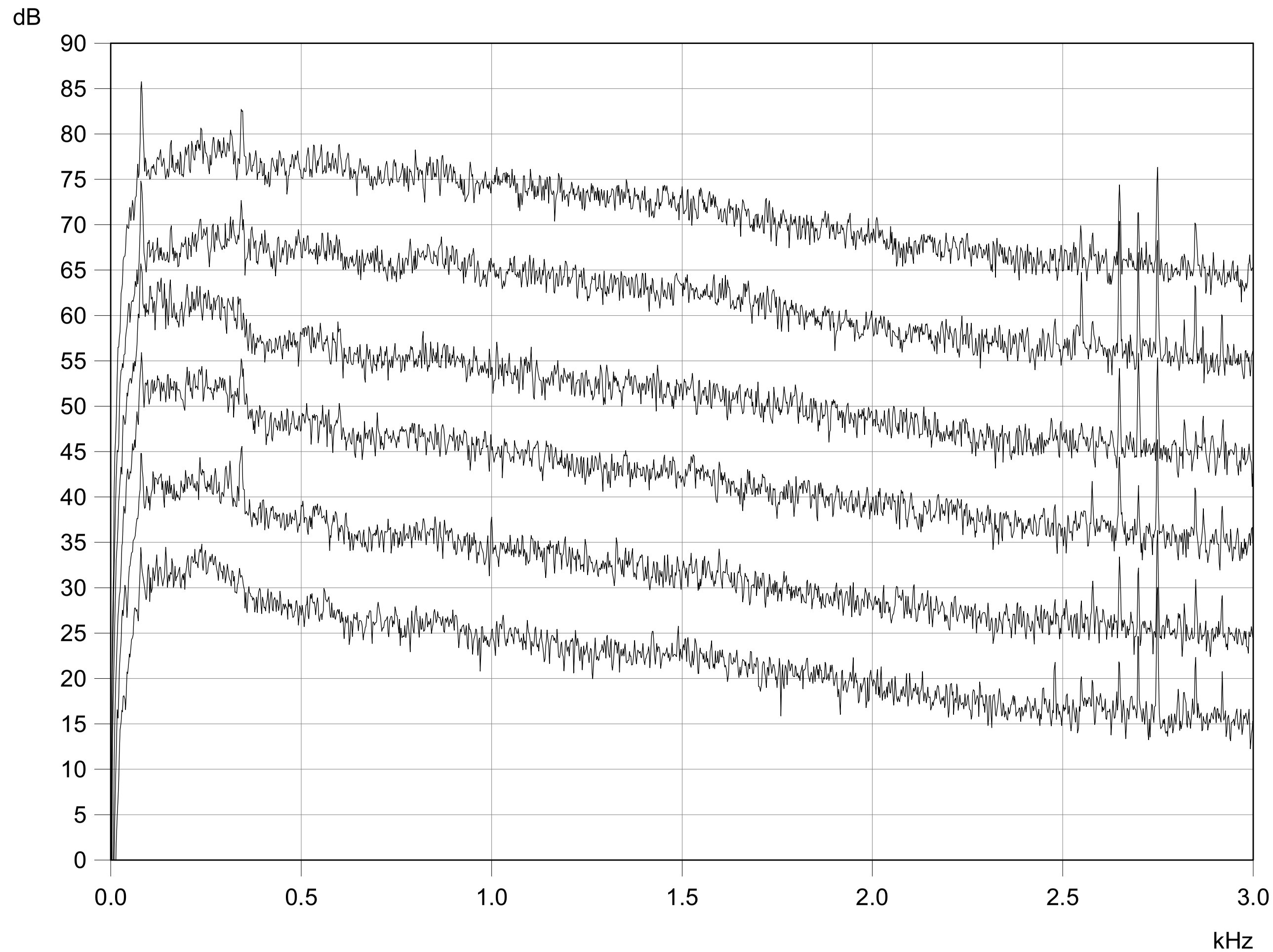
Spectra 1 – 6, at 8 m/s



Spectra 7 – 12, at 8 m/s



Spectra 1 – 6, at 9 m/s



Spectra 7 – 12, at 9 m/s

Attachment D-6
Arcola Wind Energy Conversion System Ordinance

CHAPTER 26

WIND ENERGY CONVERSION SYSTEMS

ARTICLE I.

REGULATING WIND ENERGY CONVERSION SYSTEMS WITH A RATED CAPACITY OF MORE THAN 100 KILOWATTS (kW)

SECTION ONE

STATEMENT OF PURPOSE

It is the purpose of this Section to:

1. Assure that any structures used in the commercial development and production of wind-generated electricity in the City of Arcola, Illinois and within the 1.5 mile radius surrounding its zoning jurisdiction is safe and effective.

2. Facilitate economic opportunities for local residents.

3. Promote the supply of wind energy in support of Illinois' statutory goal of increasing energy production from renewable energy source.

4. This Ordinance shall only apply to devices that together convert wind energy into electricity with a rated capacity of more than 100 kilowatts (kW).

SECTION TWO

DEFINITIONS

Definitions. The following words and terms when used in the interpretation and administration of this Ordinance shall have the meaning set forth herein except where otherwise specifically indicated.

1. **Applicant:** Shall mean the entity or person who submits to the City an application for the siting of any WECS or Substation.

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

3. **Operator:** Shall mean the entity responsible for the day-to-day operation and maintenance of the WECS, including any third party subcontractors.

4. **Owner:** Shall mean the entity or entities with an equity interest in the WECS(s), including their respective successors and assigns. Owner does not mean (1) the property owner from whom the land is leased for locating the WECS, unless the property owner has an equity interest in the WECS; or (2) any person holding a security interest in the WECS solely to secure an extension of credit, or a person foreclosing on such security interest provided that after foreclosure, such person seeks to sell the WECS at the earliest practicable date.

5. **Professional Engineer:** Shall mean a qualified individual who is licensed as a professional structural engineer in the State of Illinois.

6. **Primary Structure:** Shall mean, for each property, the structure that one or more persons occupy the majority of the time on that property for either business or personal reasons. Primary Structure includes structures such as residences, commercial buildings, hospitals, and day care facilities. Primary Structure excludes such structures as hunting sheds, storage sheds, pool houses, unattached garages and barns.

7. **Shadow Flicker:** Shall mean the visible flicker effect when rotating turbine blades cast shadows on the ground and nearby structures causing the repeating pattern of light and shadow.

8. **Substation:** Shall mean the apparatus that connects the electrical collection system of the WECS and increases the voltage for connection with the utility's transmission lines.

9. **Wind Energy Conversion System (WECS):** Shall mean all necessary devices that together convert wind energy into electricity, including the rotor, nacelle, generator, WECS Tower, electrical components, WECS foundation, transformer, and electrical cabling from the WECS tower to the Substation. This Ordinance shall only apply to devices that together convert wind energy into electricity with a rated capacity of more that 100 kilowatts (kW).

10. **WECS Project:** Shall mean the collection of WECS(s) and substations specified in the siting approval application pursuant to this ordinance.

11. **WECS Tower:** Shall mean the support structure to which the nacelle and rotor are attached.

12. **WECS Tower Hub Height:** Shall mean the distance from the center of the rotor hub to the top surface of the WECS Tower foundation.

13. **WECS Tower Tip Height:** Shall mean the distance from the rotor blade at its highest point to the top surface of the WECS foundation.

14. **City of Arcola Wind Energy Regulation Fund:** Shall mean the lien item account into which application fees shall be deposited. Expenses of City departments related to the inspection process related to WECS shall be disbursed from this account. By enacting this Ordinance the City is directing the creation of said line item fund account.

SECTION THREE

APPLICABILITY

This Ordinance governs the special use of WECS and WECS Projects. This Ordinance shall only apply to devices that together convert wind energy into electricity with a rated capacity of more than 100 kilowatts (kW).

SECTION FOUR

PROHIBITION

No WECS or WECS Project governed by this Ordinance shall be constructed, erected, installed, or located within the City of Arcola Illinois, unless prior approval has been obtained for each individual WECS and Substation pursuant to this Ordinance.

SECTION FIVE

SITING APPROVAL APPLICATION

1. To obtain approval to build any structure within the jurisdiction of this ordinance, the Applicant must first submit a permit approval application to the City. The application shall be filed with the City of Arcola City Clerk and shall be accompanied by all supporting documentation at the time of submittal.

2. To assist in the incidental costs of the application process, each applicant shall be required to pay a non-refundable application fee of $2,500.00 per structure. All fees shall be due at the time the application is submitted to the City Clerk and shall be deposited into the City of Arcola Wind Regulation Fund. When, in the opinion of the City, third party review, tests, inspection, or engineering review, tests, or inspections by the City Engineer, or third party engineering firms is required to determine or verify compliance with the adopted codes of the city or state, those additional costs shall be paid by the applicant separate and apart from the application fee.

3. The City shall have the authority to create and require the use of any application or information form necessary or useful in execution of this ordinance. However, no application, which substantially complies with the requirements of this ordinance, shall be refused appropriate review.

4. The permit approval application shall contain or be accompanied by the following information:

a. A WECS project summary, including, to the extent available: (1) a general description of the project, including its approximate name plate generating capacity; the potential equipment manufacturer(s), type(s) of WECS(s), number of WECSs, and name plate generating capacity of each WECS; the maximum height of the WECS Tower(s) and maximum diameter of the WECS(S) rotor(s); the general location of the project; and (2) a description of the Applicant, Owner and Operator, including their respective business structures;

b. The name(s), address(es), and phone number(s) of the Applicant(s), Owner(s) and Operator(s), and all property owner(s);

c. A site plan for the installation of a WECS Project showing the planned location of each WECS Tower, guy lines and anchor bases (if any), Primary Structure(s), property lines (including identification of adjoining properties), setback lines, public access roads and turnout locations, Substation(s), electrical cabling from the WECS Tower to the Substation(s), ancillary equipment, transmission lines, and layout of all structures within the geographical boundaries of any applicable setback. Any staging or layout area, where equipment will be gathered for installation, will be identified and approved by the City. It should be labeled on permit or site plan.

d. All required studies, reports, certifications, and approvals demonstrating compliance with the provisions of this Ordinance and all applicable State and Federal laws;

e. Any other information required by the City as part of its permit process, including an executed Road Agreement, the form of which will be developed by the City. The City shall develop a written application cover sheet with a checklist of required and requested information to assist in presentation of the application. The Committee may request information concerning the background and experience of any owner, operator, or construction group involved. The City may reject any application which does not substantially and in good faith, contain the required or requested information.

f. The application shall be reviewed by the City. Once the permit application is received and reviewed by the City, the City attorney may direct changes in the application. Prior to submission to the City Council, the City shall determine if any changes have been made to the project described in the application. Prior to its submission to the City Council, the application shall have as much specific location and other information as available. If such changes are made and accepted or if the application is accepted as presented, the City shall forward the same to the City Council, if the City does not recommend that application, it shall be sent to the City Council with a negative recommendation. The City Council may accept a permit application by a majority vote if the application is recommendation by the City. The granting or denial of a permit application is a final decision of the City of Arcola City Council and may be appealed as provide for in the Illinois Administrative Review Act, 735 ICLS 5/1301.

g. The applicant shall notify the City of any changes to the information provided that occur while the permit approval application is pending. Any material deviation between the specifications of the application and the actual construction are a violation of this ordinance, unless waived, in writing, by the City.

h. When proposed siting infringes upon or prevents a non-participating adjacent property owner or his agent from participating in accepted agricultural aerial application practices, the applicants must negotiate in good faith with said landowners prior to final site approval by the committee for lost opportunity and expected benefits of such applications. This issue must be satisfied before the City will consider the application.

i. When an applicant believes that a provision of this Ordinance prevents an otherwise safe, viable, and beneficial project from proceeding, the applicant may seek a variance from that provision from the City.

SECTION SIX

DESIGN AND INSTALLATION

1. DESIGN SAFETY CERTIFICATION.

   a. WECSs shall conform to applicable industry standards, including those of the American National Standards Institute (ANSI). Applicants shall submit certificates of design compliance that equipment manufacturers have obtained from Underwriters Laboratories (UL), Det Norske Veritas (DNV), Germanischer Lloyd Wind Energie (GL), or an equivalent third party. The city shall have the discretion to refuse any certification or require additional certification. Any dispute as to the sufficiency of the certification shall first be addressed by informal consultation between the Applicant, Owner/Operator, and the City. If the informal consultation does not resolve the dispute then the dispute shall be resolved by application to the City Council. Any appeal for the decision of the Council shall be as provided in the Administrative Review Act, 735 ILCS 5/3-1301. WECS shall be maintained and operated within applicable industry standards during construction and operation until their decommissioning as set out in this Ordinance.

   b. A Professional Engineer shall certify, as part of the building permit application that the foundation and tower design of the WECS is within accepted professional standards, given local soil and climate conditions.

   c. All structures other than WECS which may be built in conjunction with the operation of the WECS shall comply with applicable safety and building codes and if there are no codes which are found to be applicable then they shall comply with the International Building Code standards insofar as practical.

2. CONTROLS AND BRAKES. All WECS shall be equipped with a redundant braking system. This includes both aerodynamic overspeed controls (including variable pitch, tip, and other similar systems) and mechanical brakes. Mechanical brakes shall be operated in a fail-safe mode. Stall regulation shall not be considered a sufficient braking system for overspeed protection.

3. ELECTRICAL COMPONENTS. All electrical components of the WECS shall conform to applicable local, state, and national codes, and relevant national and international standards e.g., ANSI and International Electrical Commission.

4. COLOR. Towers and blades shall be painted white or gray or another non-reflective, unobtrusive color. No advertisement or signs shall be allowed.

5. COMPLIANCE WITH THE FEDERAL AVIATION ADMINISTRATION. The applicant for the WECS shall comply with all applicable FAA requirements. Evidence of said compliance shall be submitted at the time of the siting request.

6. WARNINGS:

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

   b. Visible, reflective, colored objects, such as flags, reflectors, or tape shall be placed on the anchor points of guy wires and along the guy wires up to a height of fifteen (15) feet from the ground.

7. CLIMB PREVENTION. All WECS towers must be unclimbable by design or protected by anti-climbing devices including, but not limited to:

   a. Fences with locking portals at least six (6) feet high; or

   b. Anti-climbing devices twelve (12) feet vertically from the base of the WECS tower.

8. SETBACKS. All WECS towers shall provide the following minimum setbacks:

   a. From Primary Structure(s): A distance equal to one and a half (1.5) times the tower hub height from any Primary Structure. The distance shall be measured from the point of the Primary Structure foundation closest to the WECS tower to the center of the WECS tower foundation. The owner of the Primary Structure may waive this setback requirement, without the applicant seeking a variance from the City, but in no case shall a WECS tower be located closer to a Primary Structure than 1.10 times the WECS tower's tip height.

b. From public roads, third party transmission lines, and communication towers: 1.10 times the WECS tower's tip height.

c. From adjacent property lines not part of the project: All WECS towers shall be setback a distance of at least 1.10 times the WECS tower's tip height. The affected adjacent property owner may waive this setback requirement without the applicant seeking a variance from the City.

d. The Applicant does not need to obtain a variance from the City upon waiver by either the City or property owner of any of the above setback requirements. Any waiver of any of the above setbacks shall run with the land and be recorded as part of the chain of title in the deed of the subject property.

9. COMPLIANCE WITH ADDITIONAL REGULATIONS. Nothing in this Ordinance is intended to preempt other applicable county, state, or federal laws and regulations.

10. USE OF PUBLIC ROADS.

a. An applicant, owner, or operator proposing to use any City of Arcola roads for the purpose of transporting WECS or substation parts and/or equipment for construction, operation, or maintenance of the WECSs or substations, shall:

i. Identify all such public roads; and

ii. Obtain applicable weight and size permits from relevant government agencies prior to construction.

b. To the extent an applicant, owner, or operator must obtain a weight or size permit from the City, the applicant, owner, or operator shall:

i. Conduct a pre-construction baseline survey to determine existing road conditions for assessing potential future damage; and

ii. Secure financial assurance, in a reasonable amount agreed to by the relevant parties, for the purpose of repairing any damage to public roads caused by constructing, operating, or maintaining the WECS.

iii. Enter into a Roadway Use and Repair Agreement approved by the City. Said agreement shall at a minimum comport with the requirements of a Road Agreement Form to be approved by the City.

SECTION SEVEN

OPERATION

1. MAINTENANCE.

   a. The owner or operator of the WECS must submit, on an annual basis, a summary of the operation and maintenance reports to the City. In addition to the above annual summary, the owner or operator must furnish such operation and maintenance reports as the City reasonably requests.

   b. Any physical modification to the WECS that alters the mechanical load, mechanical load path, or major electrical components shall require re-certification under this ordinance. Like-kind replacements shall not require re-certification. Prior to making any physical modification (other than like-kind replacements) the owner or operator shall confer with a third-party certifying entity identified in this Ordinance to determine whether the physical modification requires re-certification.

2. INTERFERENCE.

   a. The Applicant shall provide the applicable microwave transmission providers and local emergency service providers and local emergency providers (e.g., 911 operators) copies of the project summary and site plan, as set forth in this Ordinance. The Applicant shall provide evidence that any potential interference has been resolved to the satisfaction of the providers. If, after construction of the WECS, the Owner or Operator receives a written complaint related to the above-mentioned interference, the Owner or Operator shall take reasonable steps to resolve the complaint.

   b. If, after construction of the WECS, the Owner or Operator receives a written complaint related to interferences with local broadcast residential television, the Owner or Operator shall take reasonable steps to resolve the complaint.

3. COORDINATION WITH LOCAL FIRE DEPARTMENTS:

   a. The Applicant, Owner or Operator shall submit to the local fire department(s) a copy of the site plan.

b. Upon request by the local fire department(s), the Owner or Operator shall cooperate with the fire department(s) to develop the fire department's emergency response plan.

c. Nothing in this section shall alleviate the need to comply with all other applicable fire laws and regulations.

4. MATERIALS HANDLING, STORAGE AND DISPOSAL:

a. All solid wastes related to the construction, operation and maintenance of the WECS shall be removed from the site promptly and disposed of in accordance with all federal, state, and local laws.

b. All hazardous materials related to the construction, operation and maintenance of the WECS shall be handled, stored, transported and disposed of in accordance with all applicable local, state and federal laws.

SECTION EIGHT

NOISE LEVELS AND SHADOW FLICKER

1. Noise levels from each WECS or WECS Project shall be in compliance with applicable Illinois Pollution Control Board regulations. The applicant, through the use of a qualified professional, as part of the Special Use Permit application approval process, shall appropriately demonstrate compliance with the above noise requirements. Notwithstanding the foregoing, audible sound from a WECS shall not exceed fifty-five (55) dBA, as measured at the property line of a Non-Participating Landowner.

2. Reasonable efforts shall be made to minimize shadow flicker to any occupied building on a non-participating landowner's property.

SECTION NINE

BIRDS AND OTHER NATURAL RESOURCE AND WILDLIFE ISSUES

1. A qualified professional, such as an ornithologist or wildlife biologist, shall conduct an avian habitat study, as part of the Special Use Permit application approval process, to determine if the installation of WECSs will have a substantial adverse impact on birds and/or bats. The applicant must take reasonable action to mitigate such adverse impacts on habitat and migration. Consultation with the Illinois Department of Natural Resources as required pursuant to 17 Ill.adm. Code Part 1075 shall be included by any applicant. The burden to conduct such consultations shall be upon the applicant and shall be reviewed by the City. The City shall weigh the recommendations of the Illinois Department of Natural Resources, if any, but shall not be bound by them and the City shall exercise independent judgment on the acceptance or rejecting of such recommendations, unless such recommendations are required by law to be implemented.

SECTION TEN

PUBLIC PARTICIPATION

Nothing in the ordinance is meant to augment or diminish existing opportunities for public participation.

SECTION ELEVEN

LIABILITY INSURANCE AND INDEMNIFICATION

1. Commencing with the issuance of construction permits, the Applicant, Owner or Operator of the WECS(s) shall maintain a current general liability policy covering bodily injury and property damage with limits of at least $5 million per occurrence and $30 million in the aggregate. Such insurance may be provided, pursuant to a plan of self insurance, by a party with a net worth of $50 million or more. The City shall be named as an additional insured on the policy to the extent the City is entitled to indemnification.

2. Applicant, Owner or Operators shall defend, indemnify and hold harmless the City of Arcola, and their officials, employees and agents (collectively and individually, the "indemnified Parties") from and against any and all claim, demands, losses, suits, causes of action, damages, injuries, costs, expenses and liabilities whatsoever, including reasonable attorney's fees arising out of Applicant, Owner, or Operators selections, construction, operation and removal of the WECS and affiliated equipment including, without limitation, liability for property damages, or personal injury (including death), whether said liability is premised on control or on tort (including without limitation strict liability or negligence). This general indemnification shall not be construed as limiting or qualifying the County's other indemnification rights available upon law.

SECTION TWELVE

DECOMISSIONING PLAN

Prior to receiving permit approval under this Ordinance, the City and the Applicant, Owner, and/or Operator must formulate a Decommissioning Plan to ensure that the WECS Project is properly decommissioned. The Decommissioning Plan shall include:

1. Provisions describing the triggering events for decommissioning the WECS project;

2. Provisions for the removal of structures, debris and cabling, including those below the soil surface;

3. Provisions for the restoration of soil and vegetation;

4. An estimate of the decommissioning costs certified by a professional structural engineer;

5. Financial Assurance, acceptable to the City, secured by the Owner or Operator, for the purpose of adequately performing decommissioning, in an amount equal to the professional structural engineer's certified estimate of the decommissioning costs;

6. Identification of and procedures for City of Arcola to access the Financial Assurances;

7. A provision that the terms of the decommissioning Plan shall be binding upon the Owner or Operator and any of their successors, assigns, or heirs; and

8. A provision that the City shall have access to the site, pursuant to reasonable notice, to effect or complete decommissioning.

SECTION THIRTEEN

REMEDIES

1. The Applicant's, Owner's, or Operator's failure to materially comply with any of the above provisions shall constitute a default under this ordinance.

2. Prior to implementation of the existing City procedures for the resolution of such default(s), the appropriate City body shall first provide written notice to the owner and operator, setting forth the alleged default(s). Such written notice shall provide the owner and operator a reasonable time period, not to exceed sixty (60) days, for good faith negotiations to resolve the alleged default(s).

3. Any violation of this Ordinance shall be an offense punishable by a fine not to exceed $10,000.00. Each day a violation goes un-remedied after the Owner/Operator is put on notice of the violation is a separate offense via letter to Applicant/Owner /Operator by registered mail to Applicant/Owner/Operator's Illinois registered agent. It is the goal of this ordinance to promote structural safety to protect the public and the court in setting any appropriate fine shall consider the nature of the offense, the degree of public safety involved, the efforts of the City and the responsible owner or applicant to quickly and safely resolve the infraction.

4. It is understood that if the City has to take action to enforce the Ordinance against the Applicant/Owner/Operator, any expertise necessarily hired by the City – including but not limited to Attorneys Engineering experts, should the City prevail, said Applicant/Owner/Operator shall reimburse the County all funds paid by the City to said Attorneys, Engineers or other experts.

SECTION FOURTEEN

CITY AUTHORITY TO ENTER AND INSPECT

To accomplish the purpose of this Ordinance, the City, its officials, agents, and employees shall have the right to enter upon any land upon which a WECS or structure related to the operation or maintenance of such WECS, is situated. If entry is denied, the City may seek an administrative search warrant to enter and inspect the land and structures.

SECTION FIFTEEN

Except as detailed above, all other Ordinances of the City of Arcola shall retain their current language and remain in full force and effect.

SECTION SIXTEEN

Should any part of this Ordinance be declared invalid by a court of competent jurisdiction, such declaration shall not affect the validity of the remaining portions of this Ordinance.

SECTION SEVENTEEN

This Ordinance shall be in full force and effect ten days after its passage, approval, and publication in pamphlet form.

(Ordinance 10-C-1, passed and approved May 03, 2010)

ARTICLE II.

REGULATING WIND ENERGY CONVERSION SYSTEMS WITH A RATED CAPACITY OF NOT MORE THAN 100 KILOWATTS (kW)

SECTION ONE

STATEMENT OF PURPOSE

It is the purpose of this Section to:

1. Assure that any structures used in the commercial development and production of wind-generated electricity in the City of Arcola, Illinois and within the 1.5 mile radius surrounding its zoning jurisdiction is safe and effective.

2. Facilitate economic opportunities for local residents.

3. Promote the supply of wind energy in support of Illinois' statutory goal of increasing energy production from renewable energy source.

4. This Ordinance shall only apply to devices that together convert wind energy into electricity with a rated capacity of not more than 100 kilowatts (kW).

SECTION TWO

DEFINITIONS

Definitions. The following words and terms when used in the interpretation and administration of this Ordinance shall have the meaning set forth herein except where otherwise specifically indicated.

1. Small Wind Energy System: A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than 100kW.

2. Tower Height: The height above grade of the fixed portion of the tower, excluding the wind turbine itself.

SECTION THREE

APPLICABILITY

This Ordinance shall only apply to devices that together convert wind energy into electricity with a rated capacity of not more than 100 kilowatts (kW).

SECTION FOUR

PROHIBITION

No WECS or WECS Project governed by this Ordinance shall be constructed, erected, installed, or located within the City of Arcola, Illinois, unless prior approval has been obtained for each individual WECS and Substation pursuant to this Ordinance.

SECTION FIVE

PERMITTED USE

Small wind energy systems shall be a permitted use in all zoning classifications where structures of any sort are allowed; subject to certain requirements as set forth below:

a. Tower Height: For property sizes between ½ acre and one acre the tower height shall be limited to 100 ft. For property sizes of one acre or more, there is no limitation on tower height, except as imposed by FAA regulations.

b. Set-back: No part of the wind system structure, including guy wire anchors, may extend closer than ten (10) feet to the property boundaries of the installation site.

c. Noise: Small wind energy systems shall not exceed 60 dBA, as measured at the closest neighboring inhabited dwelling. The level, however, may be exceeded during short-term events such as utility outages and/or severe wind storms.

d. Approved Wind Turbines: Small wind turbines must have been approved under the Emerging Technologies program of the California Energy Commission or any other small wind certification program recognized by the American Wind Energy Association.

e. Compliance with Uniform Building Code: Building permit applications for small wind energy systems shall be accompanied by standard drawings of the wind turbine structure, including the tower, base, and footings. An engineering analysis of the tower showing compliance with the Uniform Building Code and certified by a licensed professional engineer shall also be submitted. This analysis is frequently supplied by the manufacturer. Wet stamps shall not be required.

f. Compliance with FAA Regulations: Small wind energy systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

g. Compliance with National Electric Code: Building permit applications for small wind energy systems shall be accompanied by a line drawing of the electrical components in sufficient detail to allow for a determination that the manner of installation conforms to the National Electrical Code. This information is frequently supplied by the manufacturer.

h. Utility Notification: No small wind energy system shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

i. Additional Expense: When, in the opinion of the City, third party review, tests, inspection, or engineering review, tests, or inspections by the City Engineer, or third party engineering firms is required to determine or verify compliance with the adopted codes of the city or state, those additional costs shall be paid by the applicant separate and apart from the application fee.

j. Application Process: The City shall have the authority to create and require the use of any application or information form necessary or useful in execution of this ordinance. However, no application, which substantially complies with the requirements of this ordinance, shall be refused appropriate review. The City, may require, in its discretion, additional information not contemplated in this Ordinance or on the aforementioned form in reviewing any application for a building permit of a small wind energy system. When an applicant believes that a provision of this Ordinance prevents an otherwise safe, viable, and beneficial project from proceeding, the applicant may seek a variance from that provision from the City.

SECTION SIX

REMEDIES

1. The Applicant's, Owner's, or Operator's failure to materially comply with any of the above provisions shall constitute a default under this ordinance.

2. Prior to implementation of the existing City procedures for the resolution of such default(s), the appropriate City body shall first provide written notice to the owner and operator, setting forth the alleged default(s). Such written notice shall provide the owner and operator a reasonable time period, not to exceed sixty (60) days, for good faith negotiations to resolve the alleged default(s).

3. Any violation of this Ordinance shall be an offense punishable by a fine not to exceed $1,000.00 Each day a violation goes un-remedied after the Owner/Operator is put on notice of the violation is a separate offense via letter to Applicant/Owner/Operator by registered mail to Applicant/Owner/Operator's Illinois registered agent. It is the goal of this ordinance to promote structural safety to protect the public and the court in setting any appropriate fine shall consider the nature of the offense, the degree of public safety involved, the efforts of the City and the responsible owner or applicant to quickly and safely resolve the infraction.

4. It is understood that if the City has to take action to enforce the Ordinance against the Applicant/Owner/Operator, any expertise necessarily hired by the City – including but not limited to Attorneys Engineering experts, should the City prevail, said Applicant/Owner/Operator shall reimburse the County all funds paid by the City to said Attorneys, Engineers or other experts.

SECTION SEVEN

CITY AUTHORITY TO ENTER AND INSPECT

To accomplish the purpose of this Ordinance, the City, its officials, agents, and employees shall have the right to enter upon any land upon which a WECS or structure related to the operation or maintenance of such WECS, is situated. If entry is denied, the City may seek an administrative search warrant to enter and inspect the land and structures.

SECTION EIGHT

Except as detailed above, all other Ordinances of the City of Arcola shall retain their current language and remain in full force and effect.

SECTION NINE

Should any part of this Ordinance be declared invalid by a court of competent jurisdiction, such declaration shall not affect the validity of the remaining portions of this Ordinance.

SECTION TEN

This Ordinance shall be in full force and effect ten days after its passage, approval, and publication in pamphlet form.

(Ordinance 10-C-2, approved May 03, 2010)

Attachment D-7
Libman Wind Project - Wind Turbine Sound Modeling and Ambient Noise Assessment

WES Engineering Inc.

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

Libman Wind Project

Wind Turbine Sound Modeling and Ambient Noise Assessment

Created October 2010

WES Engineering Inc.
Ph# 608-259-9304 / 608-338-0552

Report Overview

This report summarizes the measurement of ambient background noise at three receptor locations surrounding the proposed Libman Wind turbine project near Arcola, IL, and compares the predicted sound power level of the turbine at nearby receptors to measured ambient sound levels in the area.

Noise Propagation Background

Sound is a result of fluctuating air pressure. The standard unit for measuring sound pressure levels is the decibel (dB). A decibel (dB) is a unit that describes the amplitude (or difference between extremes) 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 (μPa). Typically, environmental and occupational sound pressure levels are measured in decibels on an A-weighted scale (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 (i.e., using the A-weighting filter adjusts certain frequency ranges (those that humans detect poorly)) (Colby, *et al.*, 2009). The Day Night Average Sound Level (DNL) is a standard environmental noise description which is essentially a twenty-four hour average noise level with ten decibels added to the night time noise levels. This 10 dBA penalty accounts for peoples increased sensitivity to noise at night.

The EPA has an existing design goal of 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 EPA noise guidelines are design goals and not enforceable regulations. However, these guidelines and design goals are useful tools for assessing the sound environment.

The Illinois Pollution Control Agency has developed a comprehensive approach to the measurement and assessment of commercial and industrial noise, and thus are relevant to the development and operating 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 for 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 table, 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. "

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
[Hz]	[dB]	[dB]	[dB]
31.5	75	72	72
63	74	71	71
125	69	65	65
250	64	57	57
500	58	51	51
1000	52	45	45
2000	47	39	39
4000	43	34	34
8000	40	32	32

Table 1- Illinois PCB allowable day time octave band sound power levels limits, Sec. 901.102 of the Illinois State Noise Regulation

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
[Hz]	[dB]	[dB]	[dB]
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

Table 2- Illinois PCB allowable night time octave band sound power levels limits, Sec. 901.102 of the Illinois State Noise Regulation

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

For this assessment the first column is used from the night time 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].

Turbine Sound Output

The measurement of the sound power level of the wind turbine was based on the following regulation "IEC 61400-11, Wind energy turbine generator systems - Part 11: Acoustic noise measurement techniques, 2002-12" and "IEC 61400-11:2002, Amendment 1: Wind turbine generator systems - Part 11: Acoustic noise measurement technique, June 2006". The octave sound power level is extracted from the test report "Acoustic report for a wind turbine type VENSYS 77 at the testing field for wind turbines near Grevenbroich", report no. SE07015B2, 23rd of January 2008Below is the excerpt from the turbine supplier in regards tonality:

middle frequency [Hz]	sound power level [dB] at 6 m/s	sound power level [dB] at 7 m/s	sound power level [dB] at 8 m/s
63	83,63	87,46	86,48
125	91,31	94,35	93,75
250	95,90	97,68	96,75
500	95,47	96,55	96,13
1000	95,14	96,23	96,25
2000	92,00	94,01	94,14
4000	87,50	89,72	89,83
8000	76,86	78,15	78,89
SUM	**101,6**	**103,3**	**102,9**

Table 3- Octave Band Output of Sample 1.5MW Wind Turbine- Vensys 77

To calculate a dB(A), weight each octave band level accordingly and then logarithmically add each band together. dB(A) is a weighted broadband level which approximates the ear's sensitivity to different frequencies. The weightings are as below: {-26.2, -16.1, -8.6, -3.2, 0, 1.2, 1, -1.1} (from 63 to 8k) LA=10*log10(sum(10^((Ln-Wn)/10))) where n=each octave band, L = level and W = weighting. The octave band centre frequencies are 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hz.

Background Noise Measurement Information

The existing noise environment for the wind turbine location in this area is characterized by traffic from the 4 lane Hwy 57, traffic from State road 45 and noise from the railroad. The local traffic and the agricultural work in the area are another two noticeable noise contributors during the day. Summertime noises also include insects and birds during the day and evening.

The wind project area has several neighboring residences. They all are at a significant distance from the proposed wind turbine and the noise level from the turbine at each residence was modeled and predicted in a prior WindFarmer noise study report. A preliminary ambient noise measurement was performed by taking three short noise measurement samples at three locations in Aug 2010. A decision was made later to expand the background noise measurement campaign and collect much more data. A more detailed noise measurement campaign was performed on Oct 7th and Oct 8th when 3 Larson Davis instruments were deployed simultaneously. All three of them were stationary and collected data for a minimum period of 24h. The collected data was analyzed and presented in this report. Photos are shown on pages 12-17.

The sound readings were recorded between approximately 11:50am on the 7th and 2:06pm on the 8th. WES Engineering used third-party calibrated Larson Davis Sound Level Meters. There were two instruments, model LD824, measuring octave band data in 5 seconds intervals for minimum of 24h. One instrument, model LD820, was used to measure 24h of data with 1 second interval. All of the 24h stations had a big 10 inch windscreen over the end of the microphone. The non-octave band measurements were A-weighted (dBA).

Below in Table 4 are the sound pressure values from a variety of sources in the environment, for comparison purposes.

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 4.- Noise comparison table from Colby et al

Sound decreases significantly with distance from the source. For example, sound pressure 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 point sound source. 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. The proposed Vensys 77 turbine does not have a gearbox and this additionally lowers the noise made by the turbine.

Background Noise Measurement Locations

During a project site visit on October 7th, 2010 the consultant performed 24h of background sound measurements at three sites. WES Engineering performed a background noise measurement using the Larson Davidson Models 820, 824 sound instruments (more information on the instruments is shown further in the report). The reason for the measurement was to collect the detailed data presented in this report, which can be shared with local officials and residences associated with the project. The map below and the aerial images show the locations where the Instrument was positioned for sound measurements (Site 1, Site 2 and Site3).

The turbine location is marked with a black dot and blue label (T-1). The 24h locations are marked with the light blue "**X**" and a label showing the Site number and the instrument used for the measurement.

Figure 1- Noise measurement locations

Acoustic Modeling Methodology:

The Noise modeling was done with the Windfarmer noise modeling software module. Sound level data from independent testing of an operating turbine was available for the Vensys 1.5MW turbine with the hub height (85m), 77m rotor diameter . The octave band frequencies supplied in Table 3 were used at the loudest level shown at the nacelle (7 m/s). Windfarmer allowed this maximum sound power level to be entered by octave band, see below Table 5 for the octave band values entered, the 31.5 Hz band was filled with a guess of 85dB. The turbine noise levels are measured following IEC 61400-11 regulations.

Below in Figures 2 and 3 are the modeled noise for the Libman 1.5MW turbine on an 85 m tower in dBA. The modeling shows the maximum noise level from the turbine using the sound power level provided by Vensys at the nacelle. The turbine will normally operate below this level. This noise level maximum is reached when wind speeds are at 7 m/s (15.6mph) at 8 m/s (18 mph) the measured noise was lower as a total dBA, and as wind speeds increase even higher the turbine noise is masked by the background noise of the wind blowing past leaves and other objects. The closest residence to the proposed wind turbine location (the house along 300 Ave N and near the pond and Interstate shown as) is modeled at 39.45 dBA maximum. The next closest residences are to the West, receptors shown as #'s 1- 8 in the Figure 5. These had maximum sound levels between 37.9 and 37.05 dBA. The residential areas to the South have noise levels below 36 dBA. The background sound level at most of these buildings during the day would be expected to be higher than the maximum level from the turbine due to Libman facility noise and traffic, heating and ventilating systems, and the typical area noises in a neighborhood. The separate farmstead to the northwest, #28, has a 35.13 dBA level. All other residences are further away and well below the EPA 55 DNL to 65 DNL range at residences, or ILPCB octave band limits which have a dBA equivalent of 44.4 dBA (see below section on octave band limits and dBA equivalents.

In Table 5 below the entered octave band frequencies are all the highest measured from the turbine manufacturer, so it is a blend of the 7 m/s and the 8m/s levels, whichever was higher, to make the modeling the "worst" case number.

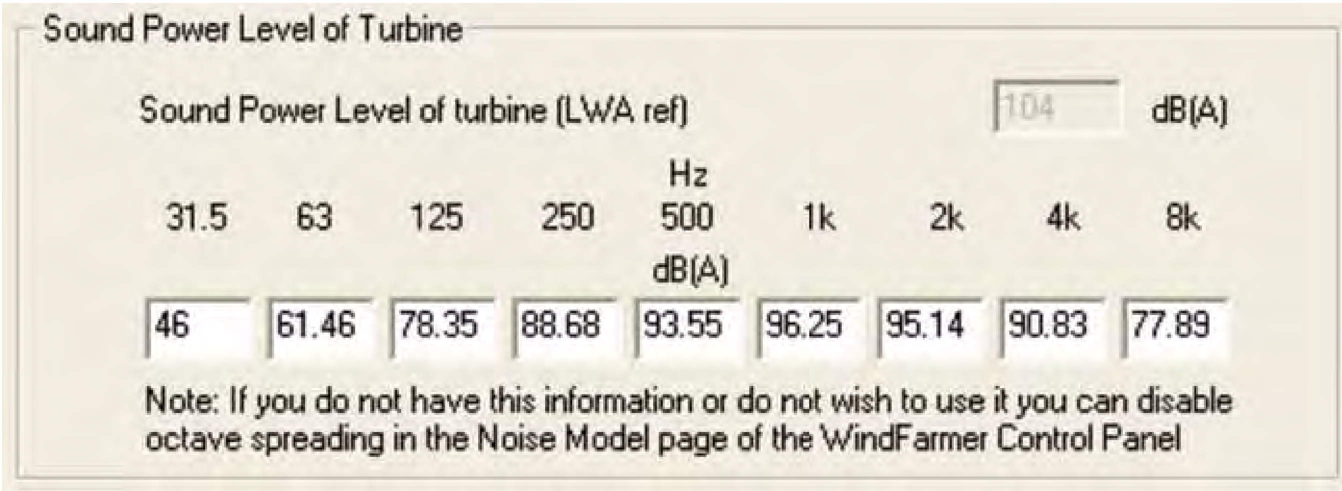


Table 5- Windographer Noise data entry screen shot

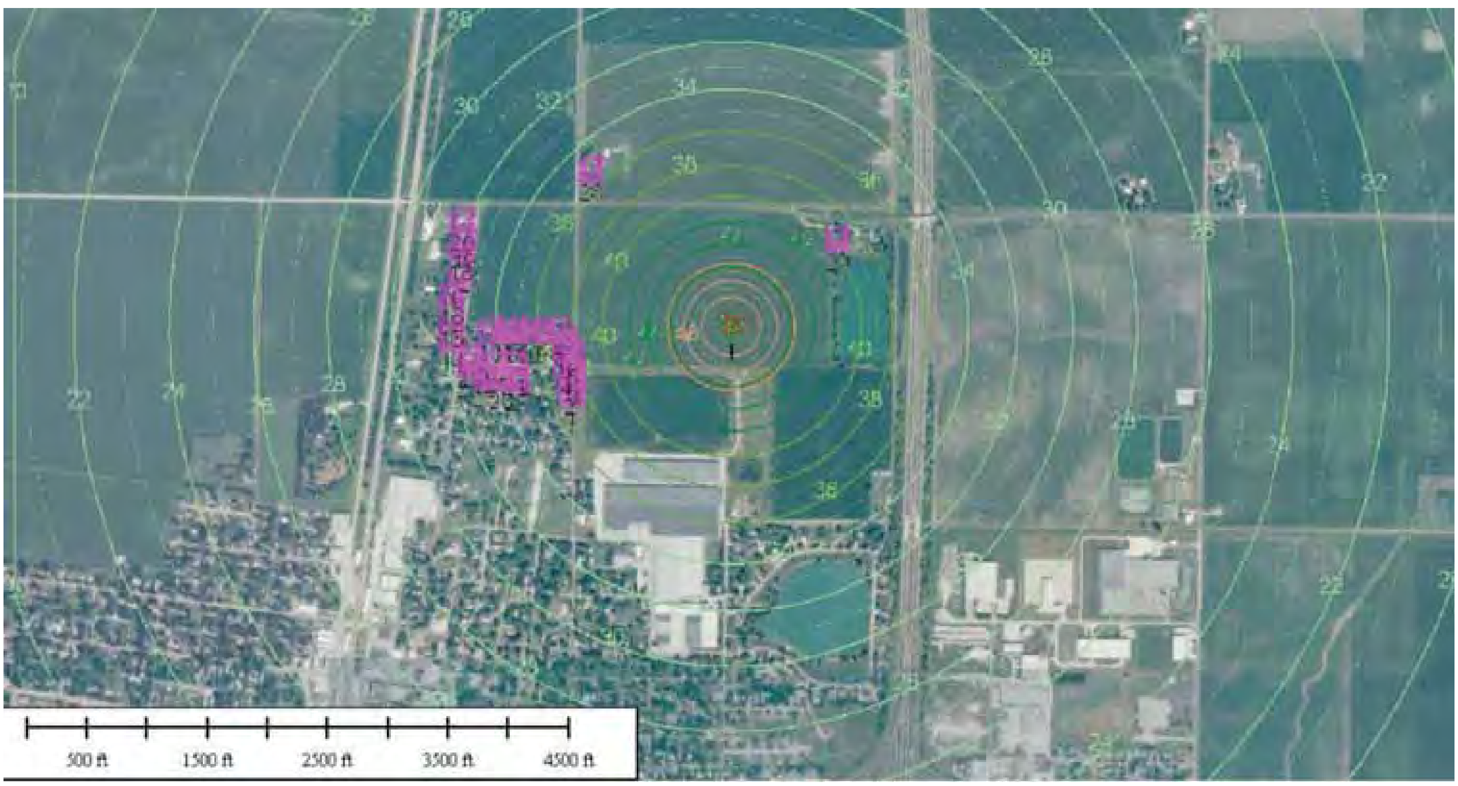


Figure 2- Libman Windfarmer modeled noise overview map

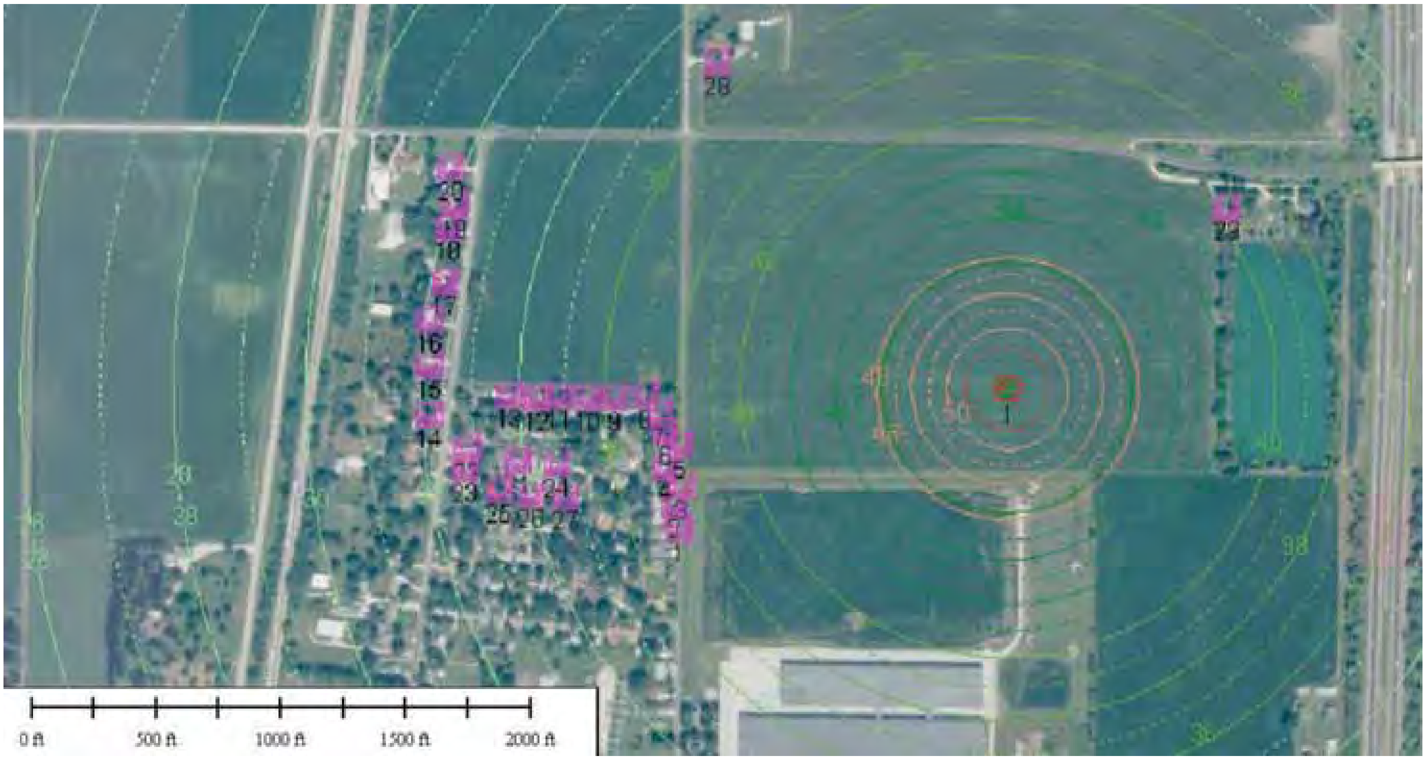


Figure 3- Libman Windfarmer modeled noise map- Noise isolines shown in dBA

The calculated WindFarmer model turbine noise levels at each dwelling are shown in the table below. The highest predicted noise level is 39.45 dBA at Dwelling ID 29. This dwelling is close to the highway, I-57, and the background noise level is expected to mask the noise from the turbine.

Dwelling ID	Noise prediction (dB(A))	Dwelling ID	Noise prediction (dB(A))	Dwelling ID	Noise prediction (dB(A))	Dwelling ID	Noise prediction (dB(A))
1	37.18	10	35.58	19	32.07	28	35.13
2	37.34	11	34.87	20	31.76	29	39.45
3	37.68	12	34.35	21	33.86		
4	37.38	13	33.76	22	32.81		
5	37.9	14	32.13	23	32.73		
6	37.56	15	32.13	24	34.68		
7	37.44	16	32.06	25	33.35		
8	37.05	17	32.25	26	34.01		
9	36.26	18	32.08	27	34.76		

Table 6- Predicted Noise at Receptors in dBA from Windfarmer software modeling

The Coordinates for receptors modeled in WindFarmer are shown in the table below

Dwelling ID	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)	Dwelling ID	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)	Dwelling ID	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)
1	440.2	388351	4394278	204	**11**	551	388206	4394441	205	**21**	606	388157	4394363	205
2	433.2	388347	4394308	204	**12**	579.1	388178	4394440	205	**22**	667.9	388093	4394376	206
3	419	388355	4394330	204	**13**	612	388145	4394443	205	**23**	672.9	388091	4394352	206
4	431.6	388336	4394353	205	**14**	710.6	388047	4394418	206	**24**	561.3	388203	4394358	205
5	409.7	388353	4394380	204	**15**	710.6	388047	4394478	206	**25**	635.6	388133	4394327	206
6	424.1	388336	4394397	204	**16**	715.3	388047	4394535	206	**26**	597.6	388173	4394321	205
7	428.9	388329	4394421	204	**17**	702.7	388067	4394581	205	**27**	557.1	388215	4394319	205
8	446.1	388311	4394441	204	**18**	714	388071	4394646	205	**28**	537.6	388399	4394849	204
9	482.1	388275	4394440	205	**19**	714.4	388079	4394673	205	**29**	348.6	389025	4394671	202
10	515.1	388242	4394439	205	**20**	735.2	388074	4394720	205					

Table 7- Receptor coordinates table

Measurement: Three sound measurement data sets were produced at length over 24 hours each in a way that there is a minimum of 24h of overlapping measurement. A data recording was made every 5 seconds for the octave band measuring LD824 instruments and every second for the LD820. The beginning and ending times of the measurements are shown in *Table 8* below.

Table 8

	24h - Site 1 – LD824		**24h - Site 2 – LD824**		**24h - Site 3 – LD820**	
	Start Date/ Time	End Date/ Time	Start Date/ Time	End Date/ Time	Start Date/ Time	End Date/ Time
Date Time:	7 Oct. 11:55	8 Oct. 14:06	7 Oct. 13:35	8 Oct. 13:53	7 Oct. 12:55	8 Oct. 13:41

In these measurements several main guidelines were observed.

First: When possible minimum distance of 120ft was kept from the main roads

Second: Minimum distance of 25ft was kept from buildings and other sound-reflecting objects

Third: The measurements were performed at 3m height

Fourth: The instruments were calibrated before each measurement

Fifth: The microphones were covered with 10 inch wind-canceling foam ball for minimizing the effect of the wind to the noise measurement.

The Description of the instruments used in the study are the following:

Larson Davis Model: 824

The Model 824 meets the IEC and ANSI requirements for Type 1, Precision Integrating Sound Level Meters, and has octave band measuring capabilities. Measurement range from 1Hz to 20kHz.

Larson Davis Model: 820

The 1/2" condenser microphones used with our Model 820 allow for a wider dynamic range and greater level of accuracy. The Model 820 meets the IEC and ANSI requirements for Type 1, Precision Integrating Sound Level Meters. Model 820 has Slow, Fast, and Impulse detector rates, and has A and C frequency weighting filters.

Larson Davis Calibrator Model CAL250

Precision Acoustic Calibrator

IEC 60942 Class 1 Handheld Sound Level Calibrator for 1” microphones at 251.2 Hz Used for Sound Level Meters and Other Sound Measuring Equipment. The CAL250 delivers a full 114.0 dB level output signal @ 251.2 Hz

Photos taken at the sound level measurement locations are shown below.

Site 1: 3555 Polk Dr

24h-Site1

Site 2: 1802 North Pond

24h-Site2

Site 3: 1156 900 N

24h-Site3

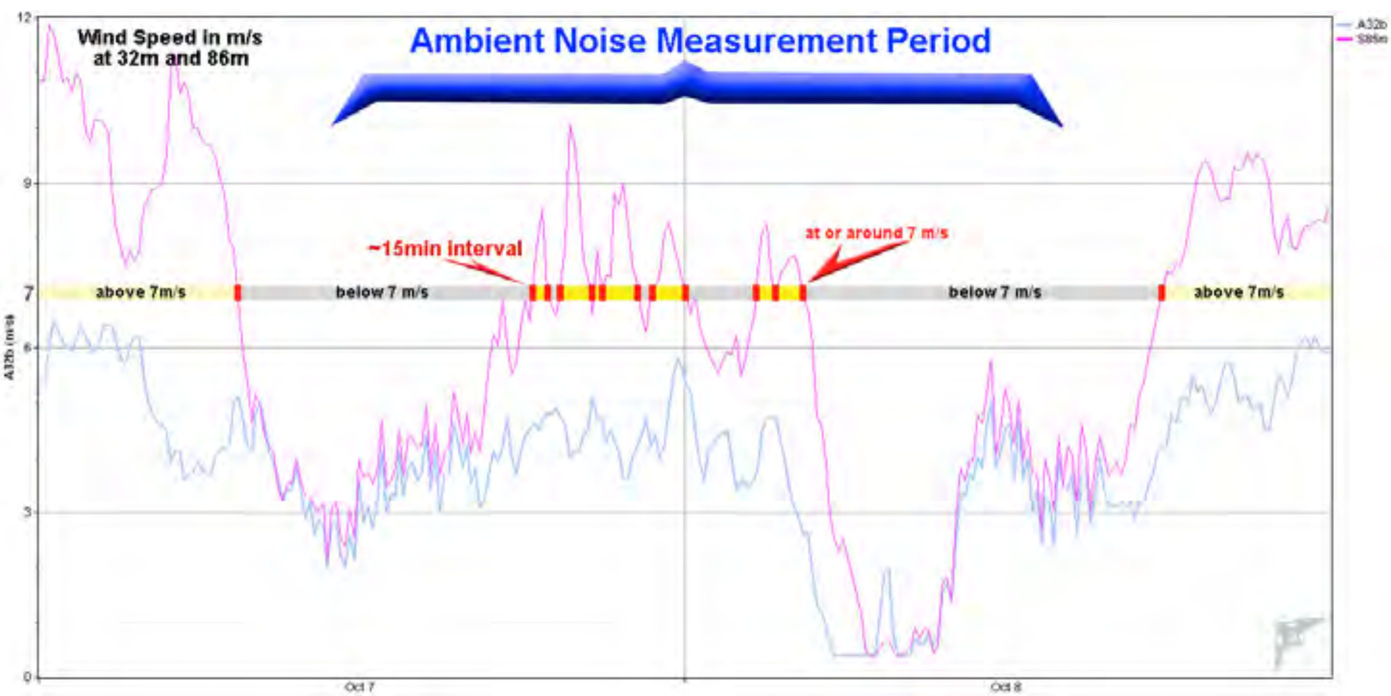
Wind Conditions

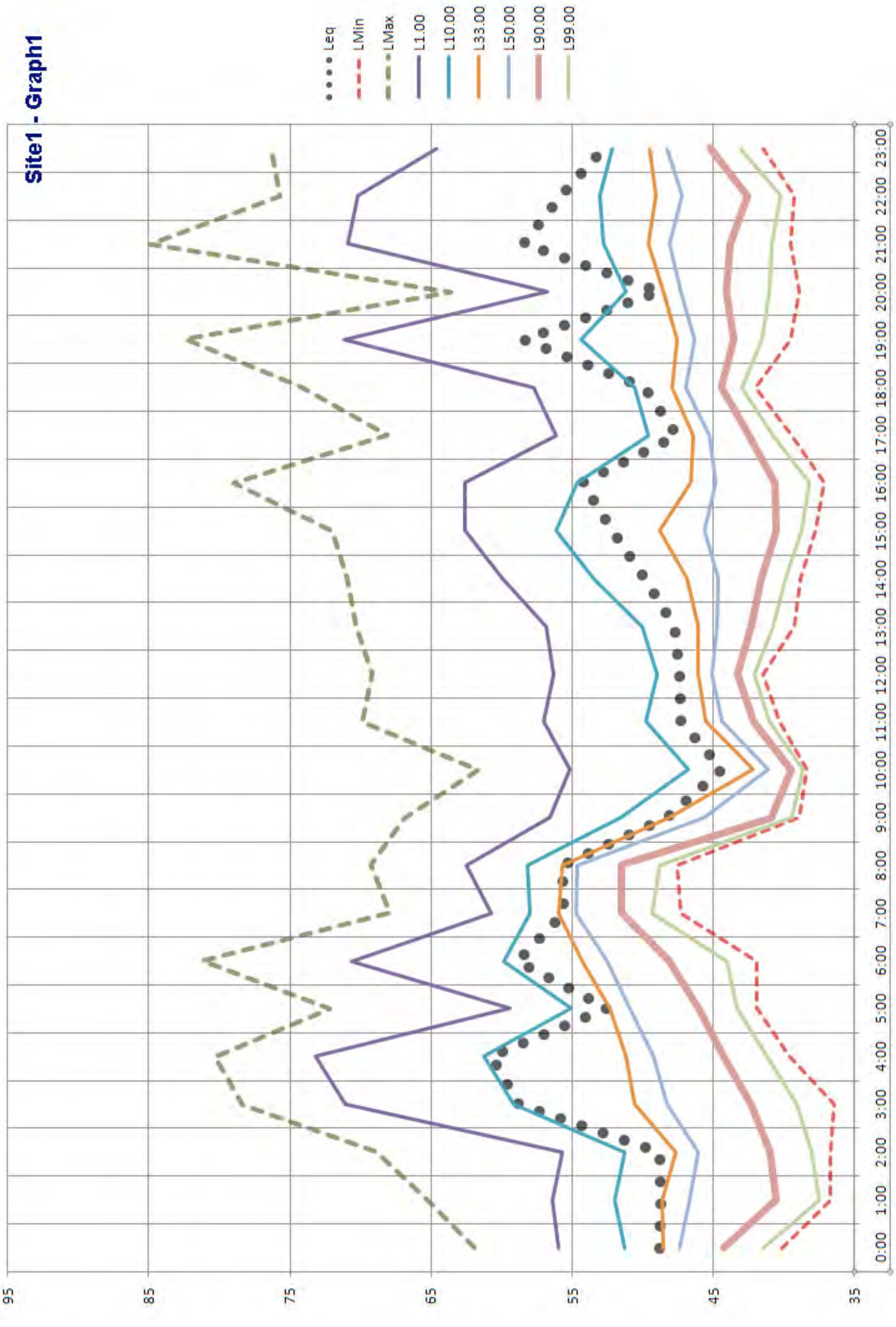
The wind conditions during the measured intervals varied significantly and covered the range from 0m/s to 10m/s. This is the wind speed interval presenting the most interest for us (see graph 1 below). The wind speeds in this graph are interpolated up to the 85m hub height. These wind conditions were obtained from the project wind measurement tower.

85m	October 7th 2010														
Time	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00			
m/s	3.8	4.0	4.2	4.5	4.9	6.1	7.4	8.0	7.5	8.2	6.9	7.7			
	October 8th 2010														
Time	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00
m/s	6.5	5.8	6.6	7.5	6.6	3.1	1.2	0.5	0.6	1.1	3.8	4.9	4.4	3.6	3.9

Graph1

During the measurement time there was total of 2 to 3 hours of wind at speeds around 7m/s (marked with rear on the graph). During these intervals of time the turbine would have generated the highest noise levels. These noise levels were used in the entire study assuming that the turbine will experience 7m/s wind 100% of the time (instead of 10% in this case). The hourly average wind speed is below.





Site1 - Graph1
Leq
LMin
LMax
L1.00
L10.00
L33.00
L50.00
L90.00
L99.00
95
85
75
65
55
45
35
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

Results and Analysis

The results of the data analysis for each site are presented below in tabular and/or graphical format. Additional information about the measurement at each site can be found in the provided on-site measurement log files.

Site1 – Long Measurement with LD824 *–10/07/2010 from 11:55 to 10/08/2010 14:06 (26h.)* **824 – SN 3555 ;** **Location:** West: 253 Polk Dr.- Barney Joergens

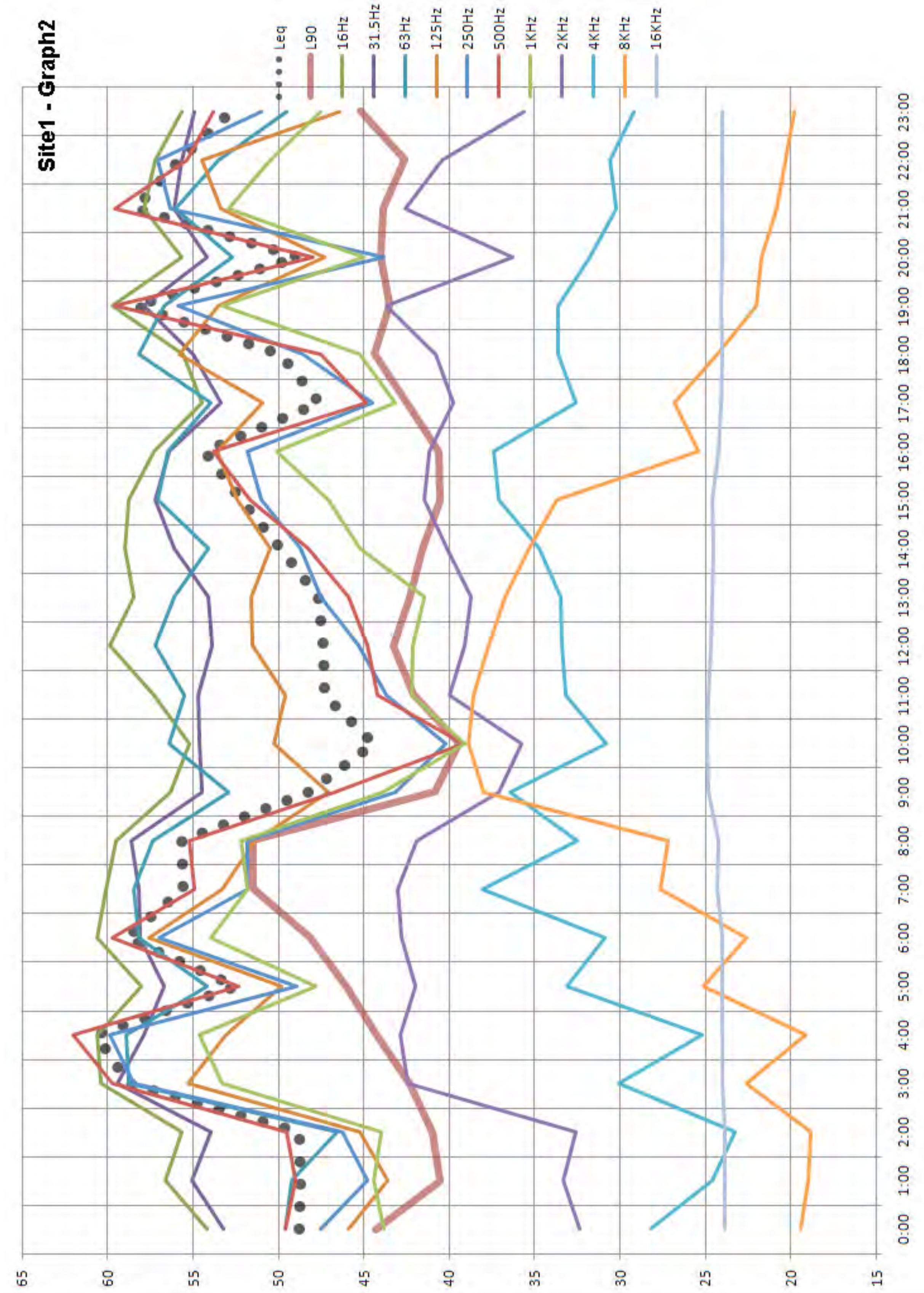
Coordinates: 39° 41.424' N, 88° 18.141' W

Time	Leq	LMin	LMax	L1.00	L10.00	L33.00	L50.00	L90.00	L99.00
0:00	48.8	40.1	61.9	56.0	51.3	48.6	47.4	44.3	41.5
1:00	48.7	36.7	65.3	56.4	52.0	48.7	46.7	40.5	37.5
2:00	48.8	36.7	68.9	55.7	51.3	47.7	46.1	41.0	38.0
3:00	58.8	36.4	78.4	71.1	59.2	50.5	48.3	42.4	39.1
4:00	60.7	39.6	80.3	73.2	61.3	51.2	49.3	44.2	41.2
5:00	52.5	41.9	72.2	59.4	55.1	52.4	50.9	46.0	43.3
6:00	58.9	41.9	81.2	70.6	59.8	54.3	52.5	48.2	44.1
7:00	55.6	47.3	67.9	60.7	58.0	55.9	54.8	51.5	49.4
8:00	55.7	47.6	69.3	62.5	58.2	55.7	54.6	51.5	48.8
9:00	48.3	38.9	66.9	56.6	51.6	48.1	45.6	40.9	39.4
10:00	44.4	38.4	61.7	55.2	46.7	42.2	41.1	39.5	38.6
11:00	47.3	40.3	69.9	57.0	49.8	45.6	44.4	42.1	41.0
12:00	47.4	41.5	69.2	56.3	49.0	46.0	45.1	43.2	42.1
13:00	47.7	39.3	70.3	56.8	50.0	46.1	44.7	42.3	40.8
14:00	49.9	38.8	70.9	60.0	53.5	46.9	44.6	41.6	39.9
15:00	52.2	37.8	72	62.6	56.2	48.8	45.6	40.5	38.7
16:00	54.3	37.1	79	62.6	54.7	46.6	44.8	40.6	38.2
17:00	47.6	39.4	68.1	56.1	49.6	46.4	45.2	42.5	40.8
18:00	49.9	42	74.2	57.7	50.6	48.0	47.0	44.4	43.0
19:00	58.4	39.5	82.4	71.2	54.4	47.6	46.4	43.5	41.6
20:00	48.8	38.9	63.6	56.8	51.2	48.5	47.3	44.0	41.0
21:00	58.4	39.5	84.9	70.9	52.8	49.6	48.1	43.8	40.8
22:00	55.8	39.3	75.7	70.2	53.0	49.0	47.2	42.6	40.2
23:00	52.8	41.5	76.3	64.7	52.2	49.5	48.2	45.2	43.0
24h avrg.	**54.5**	**41.2**	**76.6**	**66.1**	**55.1**	**50.2**	**48.7**	**45.0**	**42.6**

The measured distribution of the ambient noise in 24h by 1 octave for Site1 is presented in the table below.

Time	Leq	L90	16Hz	31.5Hz	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	16KHz
0:00	48.8	44.3	54.2	53.2	49.6	45.9	47.5	49.6	43.8	32.4	28.2	19.4	23.9
1:00	48.7	40.5	56.6	55.1	49.2	43.6	44.8	49	44.4	33.3	24.6	19	23.9
2:00	48.8	41.0	55.7	54	46.6	45.2	46.3	49.5	44	32.6	23.3	18.8	23.9
3:00	58.8	42.4	60.4	59.4	58.8	55.3	58.5	59.7	53.3	42.4	30.1	22.6	24
4:00	60.7	44.2	60.6	57.9	58.9	53.1	59.9	62	54.6	42.9	25.2	19.1	24
5:00	52.5	46.0	58	56.7	54.2	49.8	48.9	52.3	47.8	42	33.1	25.1	24
6:00	58.9	48.2	60.6	58.1	58.2	57.6	57	59.7	54	42.8	30.9	22.6	24
7:00	55.6	51.5	60.1	58.2	58.5	53.3	51.8	54.9	51.8	43	38.1	27.6	24.3
8:00	55.7	51.5	59.5	58.6	57.4	51.4	51.8	55.2	52.2	41.9	32.5	27.2	24.2
9:00	48.3	40.9	56.3	54.5	52.9	47.1	43.2	46.7	43.9	37.1	36.4	38	24.8
10:00	44.4	39.5	55.2	54.6	56.4	50.3	40.2	39.2	39.1	35.8	30.8	38.9	24.9
11:00	47.3	42.1	57.3	54.7	55.5	49.6	43.7	44.2	42.2	40	33.2	38.6	24.8
12:00	47.4	43.2	59.9	53.9	57.2	51.5	45.3	44.8	42.1	39.1	33.4	37.7	24.7
13:00	47.7	42.3	58.5	54.1	56.1	51.6	47.5	45.9	41.5	38.7	33.5	36.7	24.6
14:00	49.9	41.6	59	56.1	54.1	50.5	48.7	48.3	45.2	40.1	34.7	35.3	24.5
15:00	52.2	40.5	58.8	57.2	57.1	52.4	51	51.7	47.1	41.5	37.1	33.7	24.6
16:00	54.3	40.6	57.3	56.4	56.5	53.6	51.8	53.8	50.1	41.2	37.4	25.4	24.2
17:00	47.6	42.5	54.5	53.4	54	50.9	44.5	44.9	43.2	39.8	32.6	26.8	24.1
18:00	49.9	44.4	55.6	55	58.2	55.8	48.6	47.5	45.2	40.8	33.6	24.3	24
19:00	58.4	43.5	59.7	57.9	56.7	53.5	55.9	59.6	53.3	43.7	33.6	22	24.1
20:00	48.8	44.0	55.7	54.2	52.7	47.3	43.8	48	45	36.3	31.8	21.7	24
21:00	58.4	43.8	57.9	56.1	56	53.4	56.3	59.6	52.9	42.6	30.2	20.8	24
22:00	55.8	42.6	57.2	55.7	53.5	54.5	57.1	55.4	50.5	40.4	30.6	20.3	24
23:00	52.8	45.2	55.7	54.9	49.5	46.4	51	53.8	47.5	35.6	29.2	19.8	24
Avrg.	54.5	45.0	58.1	56.2	55.9	52.3	53.0	55.1	49.5	40.5	33.2	32.4	24.2

The same data is shown in a graphical format on the next page.



Site1 - Graph2
Leq
L90
16Hz
31.5Hz
63Hz
125Hz
250Hz
500Hz
1KHz
2KHz
4KHz
8KHz
16KHz
65
60
55
50
45
40
35
30
25
20
15
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

WES Engineering Inc.

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

1/3 octave band analysis by the hour for Site1

Time	Leq	L90	12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz
0:00	**48.8**	**44.3**	47.7	49.2	50.7	49.5	48.8	46.6	44.7	45.6	44.0	43.0	41.1	38.1	44.0	42.7	41.1	46.1
1:00	**48.7**	**40.5**	48.7	51.8	53.7	51.3	50.8	48.4	45.1	44.9	42.9	39.1	38.8	38.7	39.4	40.7	39.9	40.6
2:00	**48.8**	**41.0**	47.9	51.0	52.6	50.4	49.7	47.0	43.1	41.0	40.9	43.2	37.5	38.2	42.9	40.9	40.5	43.9
3:00	**58.8**	**42.4**	54.9	54.9	56.7	55.1	54.9	53.7	55.2	54.0	52.3	51.4	50.8	49.2	50.2	53.7	55.6	56.2
4:00	**60.7**	**44.2**	56.0	57.0	53.8	54.1	53.0	52.2	52.3	52.6	56.3	50.4	47.1	46.3	50.9	54.8	57.4	57.8
5:00	**52.5**	**46.0**	50.5	53.7	54.6	53.5	52.0	49.2	48.7	49.7	49.9	45.4	44.8	44.8	44.7	43.9	43.9	45.5
6:00	**58.9**	**48.2**	54.0	55.2	57.5	54.8	53.3	51.3	54.6	52.1	53.2	53.3	54.7	48.1	49.3	51.7	54.3	55.2
7:00	**55.6**	**51.5**	54.1	54.5	56.8	54.4	53.7	51.8	54.5	51.0	54.8	51.0	46.7	46.0	47.6	46.6	46.9	47.7
8:00	**55.7**	**51.5**	53.2	53.9	56.3	54.0	54.0	53.5	53.6	52.3	51.6	47.4	46.8	45.3	46.1	46.6	48.2	48.0
9:00	**48.3**	**40.9**	49.7	51.0	53.2	50.4	50.2	48.4	48.6	47.1	48.4	44.7	41.7	38.0	38.2	37.5	39.5	40.5
10:00	**44.4**	**39.5**	48.5	49.8	52.1	49.2	49.8	50.4	52.9	52.2	48.6	49.2	42.4	37.3	36.7	34.8	34.2	34.8
11:00	**47.3**	**42.1**	53.8	52.0	51.4	49.5	50.3	50.0	50.6	52.2	48.6	47.0	45.2	39.5	40.1	38.0	38.5	40.9
12:00	**47.4**	**43.2**	57.1	54.5	52.5	49.8	49.0	48.6	49.9	51.0	54.8	49.3	44.6	44.1	42.7	40.0	37.4	42.5
13:00	**47.7**	**42.3**	55.3	53.1	52.3	49.4	49.1	49.5	51.0	51.6	51.5	48.5	46.0	45.4	45.0	41.6	39.7	42.5
14:00	**49.9**	**41.6**	55.0	54.0	53.6	51.4	52.3	50.2	50.8	48.9	47.7	44.8	47.8	43.6	42.5	44.6	44.4	43.1
15:00	**52.2**	**40.5**	54.8	53.5	53.7	53.0	52.9	50.9	52.3	53.9	49.5	48.5	48.7	44.2	43.8	46.3	47.7	48.5
16:00	**54.3**	**40.6**	52.5	52.1	52.9	52.4	51.5	51.0	50.2	50.9	53.4	50.2	48.7	47.0	44.4	46.1	49.2	48.8
17:00	**47.6**	**42.5**	48.3	49.5	51.0	48.8	48.3	48.7	49.9	49.1	48.7	49.1	44.6	41.6	38.7	39.8	40.5	39.5
18:00	**49.9**	**44.4**	48.4	50.6	52.5	50.9	49.8	49.9	54.2	52.4	53.6	53.2	50.7	47.5	45.2	43.2	42.5	41.4
19:00	**58.4**	**43.5**	53.8	56.5	54.2	53.8	53.4	52.1	52.2	51.8	51.7	49.6	49.9	45.5	46.0	49.6	54.1	56.5
20:00	**48.8**	**44.0**	48.6	50.6	52.6	50.3	49.8	47.7	46.6	48.5	48.3	43.8	43.5	38.7	37.8	39.2	39.9	40.4
21:00	**58.4**	**43.8**	52.3	53.3	53.6	51.9	51.4	50.6	51.4	51.3	51.1	48.7	50.2	45.9	45.5	50.4	54.5	55.8
22:00	**55.8**	**42.6**	50.6	52.6	53.4	51.6	51.5	49.5	47.7	49.0	49.4	49.0	52.3	45.3	46.8	52.9	54.3	51.0
23:00	**52.8**	**45.2**	48.6	50.6	52.8	51.4	50.3	48.0	45.1	44.4	44.7	42.6	42.2	39.3	45.8	43.5	48.2	50.8
avrg.	**54.5**	**45.0**	**52.8**	**53.2**	**53.9**	**52.1**	**51.6**	**50.4**	**51.3**	**50.8**	**51.2**	**48.8**	**48.0**	**44.6**	**45.5**	**47.8**	**50.1**	**50.9**

Time	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.5 KHz	3.15 KHz	4 KHz	5 KHz	6.3 KHz	8 KHz	10 KHz	12.5 KHz	16 KHz	20 KHz
0:00	44.4	43.5	40.9	39.3	35.0	31.1	25.3	19.8	20.2	27.1	16.4	14.9	14.3	14.7	15.4	17.5	22.0
1:00	45.9	44.5	41.3	40.0	36.2	32.0	26.5	20.9	20.0	21.9	15.7	13.9	14.1	14.7	15.4	17.5	22.0
2:00	45.8	44.2	41.5	39.1	34.9	31.2	26.1	19.8	17.7	20.4	16.5	13.5	14.0	14.7	15.4	17.5	22.0
3:00	55.2	52.8	50.7	48.4	44.2	41.2	35.1	30.3	28.1	24.3	20.8	18.5	17.0	17.9	15.6	17.5	22.0
4:00	58.1	55.4	52.1	49.8	44.5	41.6	36.1	29.6	23.0	18.7	17.6	14.1	14.1	14.8	15.5	17.5	22.0
5:00	49.2	47.2	44.4	43.2	40.7	38.9	36.3	35.7	31.0	26.0	25.7	22.8	19.7	16.1	15.7	17.5	22.0
6:00	55.5	54.0	51.8	48.6	44.6	41.1	36.5	31.7	28.4	25.8	22.1	19.7	17.3	15.4	15.6	17.6	22.0
7:00	51.3	50.6	48.0	47.5	44.7	41.2	36.7	33.0	36.7	29.8	29.1	25.5	22.6	16.5	16.2	18.6	22.0
8:00	51.6	50.9	48.7	48.0	44.7	40.5	35.1	30.6	30.1	27.2	23.5	21.6	24.9	18.4	15.8	18.1	22.0
9:00	42.7	42.3	40.4	39.3	37.1	34.8	30.8	29.6	34.3	31.5	24.9	26.7	36.1	32.5	16.7	19.5	22.2
10:00	34.5	34.1	34.5	34.6	33.6	32.8	30.8	28.2	27.4	26.6	22.7	19.0	34.6	36.8	16.8	19.0	22.6
11:00	38.1	38.7	37.8	37.7	36.7	36.8	34.2	34.3	30.9	27.7	24.2	21.3	33.1	37.0	17.0	18.6	22.6
12:00	38.0	38.0	37.7	37.2	37.0	36.1	33.9	31.9	31.2	27.5	24.6	21.8	33.3	35.6	16.8	18.5	22.5
13:00	40.5	40.0	37.6	36.6	35.9	35.0	34.0	32.1	31.0	28.4	24.7	21.5	32.0	34.7	16.7	18.4	22.4
14:00	45.3	41.5	41.5	40.5	38.9	37.2	35.0	32.4	31.7	28.5	28.8	23.3	28.8	33.9	16.6	18.3	22.3
15:00	46.9	44.6	43.8	41.9	40.7	38.6	36.5	33.9	35.4	30.4	28.0	25.3	28.6	31.0	17.1	18.2	22.2
16:00	49.0	49.2	48.3	43.8	40.7	38.3	37.0	31.8	36.3	28.5	27.2	21.8	21.2	17.9	15.9	17.8	22.1
17:00	40.8	40.0	39.0	39.0	37.1	36.2	35.2	32.9	30.6	26.3	24.2	25.6	18.9	15.9	15.9	17.6	22.0
18:00	43.6	42.9	41.7	40.4	38.8	37.3	36.2	33.8	29.7	28.5	28.2	22.1	18.1	15.8	15.7	17.6	22.0
19:00	55.0	51.7	49.9	48.9	45.8	42.7	35.5	30.6	27.4	30.6	27.6	18.8	16.9	15.5	15.7	17.6	22.0
20:00	44.5	43.7	41.6	40.7	37.5	34.0	30.9	27.7	25.8	29.5	23.8	18.8	15.9	15.1	15.5	17.5	22.0
21:00	55.5	52.5	49.7	48.1	45.5	41.2	35.8	30.3	25.6	27.2	21.8	17.6	15.0	14.9	15.5	17.5	22.0
22:00	51.1	49.6	47.4	46.1	42.5	39.0	33.5	28.8	25.2	28.5	21.1	16.8	14.7	14.8	15.5	17.5	22.0
23:00	47.6	48.1	44.8	43.0	38.4	34.1	29.5	23.5	22.0	27.7	19.0	15.9	14.2	14.8	15.4	17.5	22.0
avrg.	**50.9**	**48.9**	**46.6**	**44.7**	**41.4**	**38.4**	**34.5**	**31.2**	**30.8**	**27.8**	**24.8**	**21.6**	**28.1**	**29.7**	**16.0**	**18.0**	**22.1**

Site2 – Long Measurement with LD824 – ***10/07/2010 from 13:35 to 10/08/2010 13:53 (25.5h.);*** ***824 sn1802*** **Location:** East: North of the North Pond and next to Interstate 57 - Ben and Julie Ashworth

Coordinates: 39° 41.673' N, 88° 17.604' W

The analyzed data is shown below in table format and it follows on the next page in graphical format.

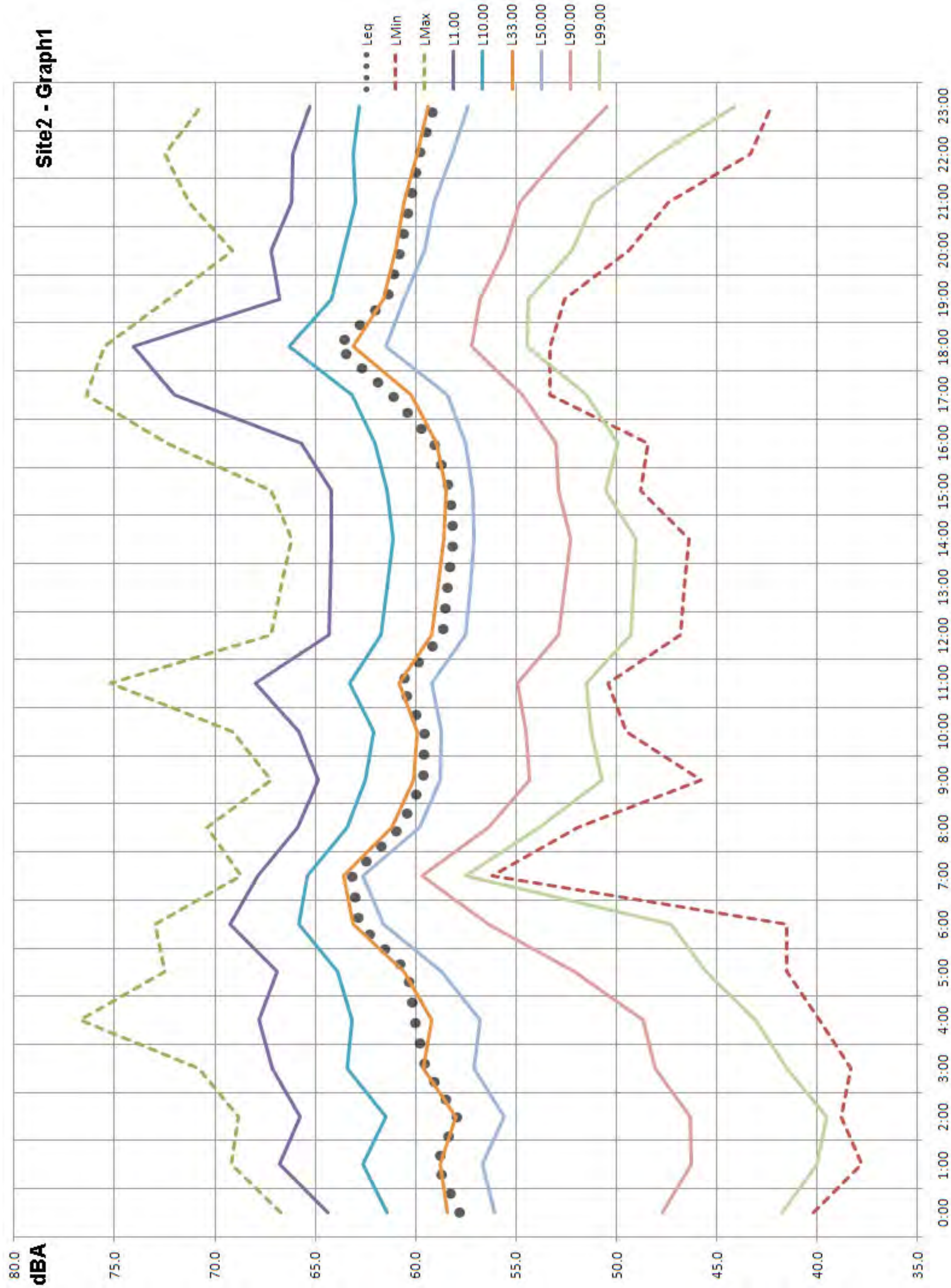
Time	Leq	LMin	LMax	L1.00	L10.00	L33.00	L50.00	L90.00	L99.00
0:00	**57.8**	40.2	66.7	64.4	61.4	58.4	56.1	**47.7**	41.8
1:00	**58.9**	37.8	69.2	66.8	62.6	58.8	56.7	**46.3**	40.0
2:00	**57.9**	38.8	68.8	65.8	61.5	58.0	55.6	**46.3**	39.5
3:00	**59.5**	38.3	70.8	67.2	63.4	59.6	57.1	**48.1**	41.5
4:00	**60.1**	39.9	76.7	67.8	63.2	59.2	56.8	**48.7**	43.1
5:00	**60.4**	41.5	72.5	66.9	63.9	60.6	58.7	**52.1**	45.5
6:00	**62.8**	41.5	73.0	69.3	65.8	63.1	61.6	**56.4**	47.3
7:00	**63.2**	56.2	68.7	67.9	65.4	63.6	62.6	**59.7**	57.5
8:00	**60.7**	51.9	70.4	65.9	63.4	61.2	59.8	**56.4**	53.8
9:00	**59.6**	45.8	67.2	64.9	62.5	60.1	58.8	**54.3**	50.7
10:00	**59.6**	49.5	69.1	65.8	62.1	59.9	58.7	**54.5**	51.2
11:00	**60.7**	50.4	75.2	68.0	63.3	60.8	59.2	**54.9**	51.5
12:00	**58.7**	46.8	67.2	64.3	61.7	59.2	57.5	**52.9**	49.3
13:00	**58.4**	46.6	66.7	64.2	61.4	58.9	57.3	**52.6**	49.1
14:00	**58.1**	46.4	66.2	64.2	61.1	58.6	57.1	**52.3**	49.0
15:00	**58.3**	48.8	67.2	64.2	61.4	58.5	57.2	**52.9**	50.5
16:00	**59.1**	48.4	72.4	65.7	62.0	59.0	57.5	**53.0**	49.9
17:00	**61.2**	53.3	76.4	72.0	63.2	60.2	58.4	**54.7**	51.5
18:00	**63.9**	53.3	75.5	74.1	66.3	63.1	61.5	**57.2**	54.5
19:00	**61.4**	52.6	72.3	66.8	64.2	61.6	60.6	**56.8**	54.4
20:00	**60.7**	49.4	69.1	67.2	63.6	61.0	59.6	**55.6**	52.2
21:00	**60.3**	47.4	71.3	66.2	63.0	60.6	59.1	**54.8**	51.2
22:00	**59.8**	43.3	72.5	66.1	63.1	59.9	58.2	**52.8**	47.9
23:00	**59.1**	42.3	70.7	65.3	62.8	59.4	57.4	**50.5**	44.1
24h avrg.	**60.3**	**49.1**	**71.8**	**67.5**	**63.2**	**60.4**	**58.8**	**54.2**	**50.8**

The graphical representation of the hourly data from Site2 is shown on the next page.

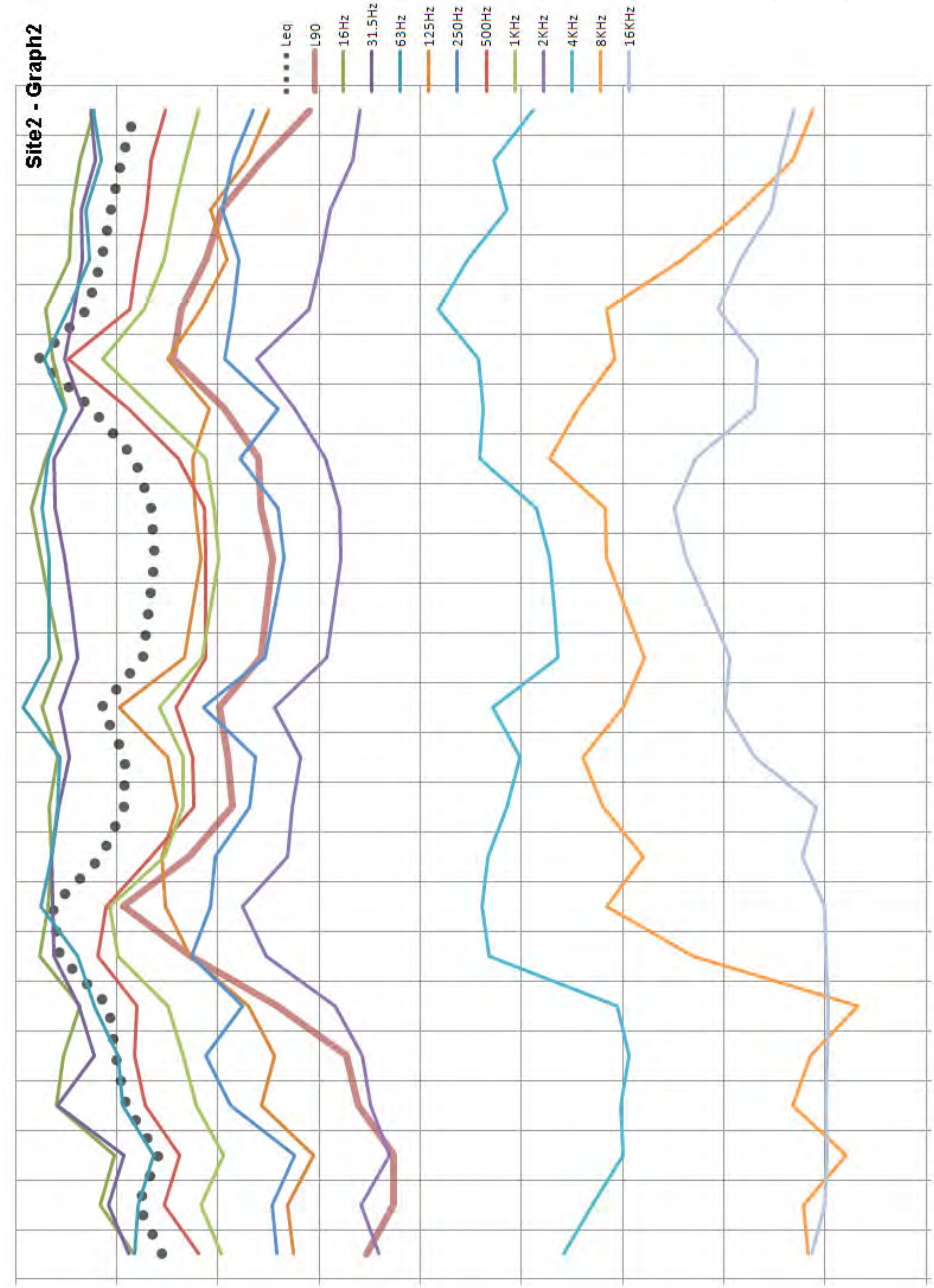
The measured distribution of the ambient noise in 24h by 1 octave for Site2 is presented in the table below.

Time	Leq	L90	16Hz	31.5Hz	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	16KHz
0:00	**57.8**	**47.7**	59.2	59.4	59.1	51.2	52.1	56.0	54.9	47.0	37.9	25.8	25.6
1:00	**58.9**	**46.3**	60.8	60.4	58.9	51.6	52.3	57.7	55.8	47.9	36.5	26.1	25.0
2:00	**57.9**	**46.3**	60.1	59.6	58.2	50.3	51.2	56.9	54.7	46.5	34.9	23.9	24.9
3:00	**59.5**	**48.1**	63.0	62.9	59.7	52.9	54.4	58.6	56.1	47.5	35.1	26.6	25.0
4:00	**60.1**	**48.7**	62.7	61.1	60.0	52.2	55.6	59.1	56.7	47.9	34.7	25.7	24.9
5:00	**60.4**	**52.1**	61.8	61.9	61.1	53.5	53.8	59.0	57.5	49.2	35.3	23.4	24.8
6:00	**62.8**	**56.4**	63.8	63.1	61.9	56.4	56.3	60.9	59.9	52.6	41.6	31.5	25.0
7:00	**63.2**	**59.7**	63.4	63.1	63.8	57.6	55.4	60.5	60.4	53.8	41.9	35.8	25.0
8:00	**60.7**	**56.4**	63.2	63.2	63.2	57.8	55.1	58.3	57.7	51.5	41.7	34.0	26.1
9:00	**59.6**	**54.3**	63.3	62.9	63.0	57.0	53.4	56.2	56.7	51.3	40.7	35.9	25.4
10:00	**59.6**	**54.5**	62.9	62.3	62.8	57.5	53.1	56.2	56.7	50.9	40.1	37.0	28.5
11:00	**60.7**	**54.9**	63.7	62.8	64.7	59.9	55.7	57.1	57.9	52.2	41.4	35.0	29.9
12:00	**58.7**	**52.9**	62.8	61.9	63.3	56.7	52.6	55.6	55.8	49.6	38.2	33.9	29.7
13:00	**58.4**	**52.6**	**63.3**	**62.3**	**63.3**	**56.3**	**52.2**	**55.6**	**55.4**	**49.3**	**38.4**	**34.9**	**30.8**
14:00	**58.1**	**52.3**	63.8	62.6	63.3	55.8	51.7	55.6	55.0	48.9	38.6	35.8	31.9
15:00	**58.3**	**52.9**	64.2	63.0	63.7	56.1	52.0	55.6	55.2	49.0	39.2	35.9	32.4
16:00	**59.1**	**53.0**	63.5	63.1	63.4	56.3	53.9	57.0	55.6	49.7	42.1	38.6	31.4
17:00	**61.2**	**54.7**	62.5	61.7	62.6	55.4	52.0	59.4	58.2	51.2	41.9	37.2	28.5
18:00	**63.9**	**57.2**	63.2	62.6	63.6	57.5	54.7	62.4	60.7	53.1	42.1	35.4	28.4
19:00	**61.4**	**56.8**	63.5	62.1	62.4	55.8	54.2	59.4	58.6	50.5	44.1	35.8	30.3
20:00	**60.7**	**55.6**	62.3	61.7	61.4	54.5	54.0	59.0	57.7	49.9	42.7	32.0	29.2
21:00	**60.3**	**54.8**	62.2	61.8	61.5	55.4	54.8	58.5	57.2	49.4	40.7	29.1	27.6
22:00	**59.8**	**52.8**	61.8	61.1	60.8	53.5	54.2	58.3	56.6	48.4	41.4	26.6	27.2
23:00	**59.1**	**50.5**	61.1	61.3	61.2	52.5	53.2	57.6	55.9	48.0	39.4	25.6	26.5
Avrg.	**60.3**	**54.2**	**62.7**	**62.1**	**62.3**	**55.8**	**53.9**	**58.3**	**57.3**	**50.3**	**40.3**	**33.8**	**28.4**

The graphical representation of the hourly 1 octave data from Site2 is shown on the next page.



Site2 - Graph1
Leq
LMin
LMax
L1.00
L10.00
L33.00
L50.00
L90.00
L99.00
dBA
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00



Site2 - Graph2
Leq
L90
16Hz
31.5Hz
63Hz
125Hz
250Hz
500Hz
1KHz
2KHz
4KHz
8KHz
16KHz
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

WES Engineering Inc.

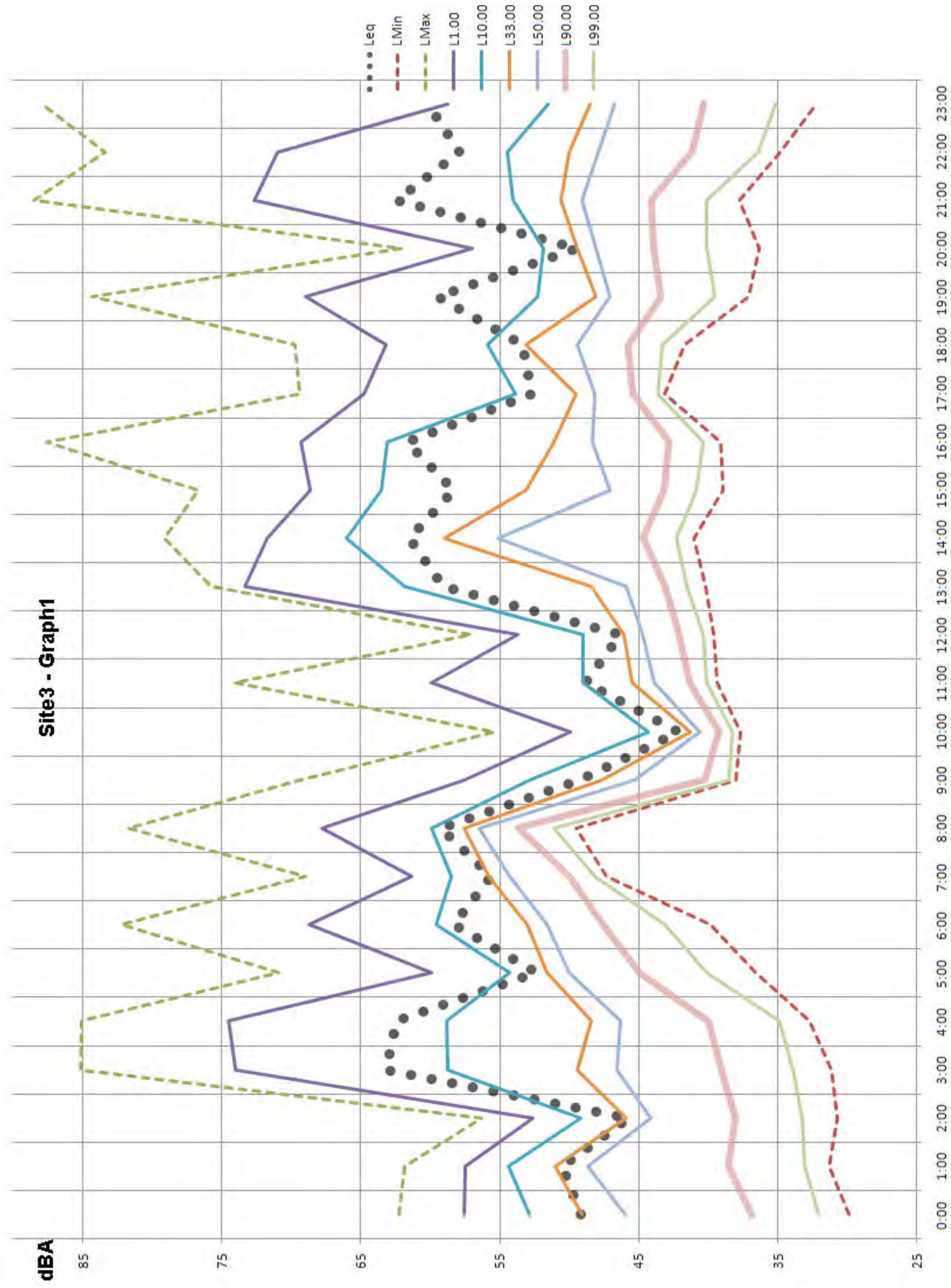
706 S. Orchard St, Madison, WI 53715, Ph# 608-259-9304; 608-338-0552 www.WESengineering.com

Site3 – Long Measurement with LD820 – *10/07/2010 from 12:55 to 10/08/2010 13:41 (24h.)* **LD 820 (Serial# ---1156);** **Location:** Northwest: 311 900N (N. Elm St.) - Myron Shonkwiler **Coordinates:** 39° 41.795' N, 88° 18.093' W

At this site the LD820 was used and the data is not separated by frequency. The analyzed data is shown below in table format and it follows on the next page in graphical format.

Time	Leq	LMin	LMax	L1.00	L10.00	L33.00	L50.00	L90.00	L99.00
0:00	**49.2**	29.9	62.3	57.6	52.9	49.1	46	**36.9**	32.1
1:00	**50.5**	31.3	61.8	57.5	54.4	51	48.7	**38.6**	33.1
2:00	**45.7**	30.7	56.3	52.6	49.2	45.9	44.1	**38.1**	33.2
3:00	**63.2**	31.1	85.2	74	58.7	49.4	46.6	**39.1**	33.9
4:00	**62.4**	32.7	85.1	74.5	58.8	48.4	46.3	**40**	34.9
5:00	**52.4**	36.6	70.9	59.9	54.3	51.6	50	**44.9**	40.1
6:00	**58.3**	39.9	82.2	68.7	59.6	53	51.6	**47.5**	43.1
7:00	**55.6**	47.3	69	61.3	58.5	55.8	54.3	**50**	48.2
8:00	**59.2**	49.5	81.7	67.8	59.9	57.6	56.5	**53.7**	51.1
9:00	**49.3**	38	69.4	57.6	52.9	47.7	45.3	**40.2**	38.5
10:00	**42.1**	37.7	55.4	49.9	44.3	41.3	40.6	**39.2**	38.3
11:00	**48.8**	39.4	74.1	59.9	49	45.5	43.9	**41.3**	40.1
12:00	**46.3**	39.6	57.1	53.7	49	46.1	44.7	**42.1**	40.4
13:00	**59.1**	40.2	75.8	73.3	61.8	48.4	45.9	**43.1**	41.5
14:00	**61.5**	41	79.1	71.7	66	59	55.1	**44.7**	42.3
15:00	**58.3**	38.9	76.7	68.6	63.5	53.1	47.1	**43.2**	40.9
16:00	**61.7**	39.1	87.6	69.3	63.1	51.1	48.3	**42.8**	40.4
17:00	**52.7**	43.1	69.4	64.8	53.9	49.5	48.2	**45.4**	43.6
18:00	**53.4**	41.7	69.7	63.2	55.9	53.1	49.4	**45.8**	43.3
19:00	**59.5**	37.1	84.3	69	52.3	48.1	47.1	**43.4**	39.5
20:00	**49.4**	36.3	62.1	57	51.9	49.4	48.1	**43.9**	40.1
21:00	**62.4**	37.8	88.5	72.7	54	50.6	49.1	**44.1**	40.1
22:00	**57.9**	34.8	83.4	71	54.5	50	47.9	**41.2**	36.4
23:00	**60.2**	32.2	87.9	58.7	51.5	48.5	46.7	**40.3**	35.2
24h avrg.	**58.1**	**40.8**	**81.8**	**68.5**	**58.4**	**52.0**	**49.7**	**45.0**	**42.3**

The graphical format of this data is presented on the next page.



Site3 - Graph1
dBA
85
75
65
55
45
35
25
Leq
LMin
LMax
L1.00
L10.00
L33.00
L50.00
L90.00
L99.00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

Site3 – 1/3 octave band data

Time	Leq	L90	12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz
0:00	**57.8**	**47.7**	51.6	54.1	56.3	55.3	54.7	53.9	52.7	55.6	54.2	48.2	45.1	45.3	48.4	47.5	45.6	47.3
1:00	**58.9**	**46.3**	52.7	55.7	58.1	56.2	56.0	54.6	53.2	54.5	54.7	48.1	45.7	46.3	48.2	47.1	47.3	50.1
2:00	**57.9**	**46.3**	52.1	55.6	57.1	55.3	55.3	53.8	52.0	53.4	54.5	47.3	43.9	44.6	47.0	45.8	46.4	48.8
3:00	**59.5**	**48.1**	56.3	57.7	59.9	58.4	58.1	58.0	54.5	54.8	55.5	48.8	47.3	48.0	50.2	49.8	48.5	49.1
4:00	**60.1**	**48.7**	56.8	59.1	57.4	57.7	56.3	54.2	53.1	55.6	56.3	47.9	46.1	48.1	50.4	51.3	50.8	51.0
5:00	**60.4**	**52.1**	54.6	57.4	58.3	57.6	57.3	56.3	54.3	56.7	57.5	49.7	47.0	49.0	49.5	48.9	48.5	49.1
6:00	**62.8**	**56.4**	56.5	58.8	60.8	58.8	58.8	57.3	56.2	57.2	57.9	53.0	50.9	50.4	51.4	51.3	51.8	52.8
7:00	**63.2**	**59.7**	56.2	58.3	60.4	58.4	59.0	57.7	57.5	58.6	60.3	54.4	52.7	50.6	51.2	50.4	50.1	51.2
8:00	**60.7**	**56.4**	56.2	57.8	60.4	58.2	58.7	58.5	56.7	58.1	59.9	54.1	52.8	51.7	50.2	50.2	50.7	51.0
9:00	**59.6**	**54.3**	55.3	58.4	60.5	58.5	58.2	57.5	56.1	58.2	59.6	54.3	51.4	49.8	48.6	48.3	48.9	48.5
10:00	**59.6**	**54.5**	55.0	57.9	60.1	57.6	57.5	57.6	57.1	57.5	59.3	54.5	52.7	49.6	49.0	48.0	48.0	48.5
11:00	**60.7**	**54.9**	57.5	58.3	60.5	58.3	57.8	58.0	59.0	59.6	60.8	56.6	55.0	52.9	51.9	50.4	50.3	49.5
12:00	**58.7**	**52.9**	56.6	57.6	59.3	57.2	56.8	57.5	56.4	58.3	60.2	54.0	51.0	49.4	48.7	47.5	47.3	47.8
13:00	58.4	52.6	56.8	58.2	59.9	57.6	57.3	57.6	56.9	58.5	59.8	53.9	50.3	48.5	47.9	47.1	47.1	47.6
14:00	**58.1**	**52.3**	57.1	58.8	60.4	57.9	57.7	57.7	57.4	58.6	59.4	53.7	49.6	47.7	47.0	46.8	47.0	47.4
15:00	**58.3**	**52.9**	57.7	59.1	60.9	58.8	58.3	57.7	57.1	58.9	60.1	54.1	50.1	47.2	47.2	47.0	47.6	47.7
16:00	**59.1**	**53.0**	56.5	58.5	60.3	58.7	58.2	58.1	57.3	58.7	59.6	54.0	50.1	48.5	47.5	48.9	50.4	50.1
17:00	**61.2**	**54.7**	55.2	57.4	59.6	57.1	56.9	56.7	56.6	57.8	58.7	53.1	49.7	47.4	47.3	47.1	47.3	50.5
18:00	**63.9**	**57.2**	55.4	58.4	60.1	57.9	57.9	57.7	56.3	59.5	59.9	55.2	51.6	49.5	50.3	49.5	49.8	51.6
19:00	**61.4**	**56.8**	56.6	59.6	59.5	58.1	57.3	56.6	56.2	58.5	57.9	52.2	51.4	48.9	49.6	49.1	49.7	50.9
20:00	**60.7**	**55.6**	54.6	57.3	59.5	57.2	57.1	56.4	55.2	57.2	57.2	50.5	50.4	48.1	49.8	49.1	48.5	49.9
21:00	**60.3**	**54.8**	55.5	57.5	58.8	57.0	57.0	57.0	55.4	57.1	57.5	52.1	50.1	49.1	50.4	49.8	49.9	50.3
22:00	**59.8**	**52.8**	54.4	57.2	58.5	57.0	56.5	55.2	54.5	56.3	56.9	49.9	47.6	48.4	49.5	49.7	49.2	49.3
23:00	**59.1**	**50.5**	53.5	56.3	58.1	57.2	56.7	55.5	53.7	57.2	57.5	48.5	46.3	48.0	49.4	48.2	47.6	49.0
avrg.	**60.3**	**54.2**	**55.7**	**57.9**	**59.5**	**57.7**	**57.4**	**56.9**	**56.0**	**57.6**	**58.5**	**52.8**	**50.3**	**49.0**	**49.4**	**49.0**	**49.0**	**49.8**

Time	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.5 KHz	3.15 KHz	4 KHz	5 KHz	6.3 KHz	8 KHz	10 KHz	12.5 KHz	16 KHz	20 KHz
0:00	52.5	52.2	50.8	50.7	48.4	45.2	41.1	36.6	34.9	32.3	31.3	22.0	20.7	20.2	20.9	20.2	21.4
1:00	54.2	53.4	51.9	51.5	49.4	46.1	42.0	37.3	32.8	31.0	31.1	22.9	20.9	19.6	19.1	19.9	21.4
2:00	53.1	53.2	51.0	50.4	47.8	44.6	40.8	36.1	31.4	29.2	29.7	19.8	19.0	18.7	18.8	19.9	21.3
3:00	54.7	55.4	52.3	52.0	49.0	45.5	41.8	37.1	32.4	29.6	27.4	23.3	21.6	20.1	19.1	19.9	21.4
4:00	55.7	55.1	53.6	51.7	49.8	46.2	41.7	37.0	32.1	29.5	26.5	23.0	19.8	19.0	18.8	19.9	21.3
5:00	56.0	54.9	53.6	53.4	50.5	47.3	43.5	38.7	33.7	28.9	23.4	19.5	18.0	18.2	18.6	19.8	21.3
6:00	57.4	57.0	55.5	56.1	53.4	50.8	46.7	42.0	38.5	37.6	32.2	30.3	24.2	20.1	19.0	19.9	21.4
7:00	56.5	57.4	55.5	56.4	54.8	51.9	48.0	43.5	39.6	36.4	33.2	32.1	33.0	22.6	19.1	19.9	21.4
8:00	54.3	54.5	53.3	53.5	51.6	49.5	45.8	41.7	39.8	35.1	32.7	32.3	28.1	21.4	19.8	22.5	21.3
9:00	52.7	51.9	51.7	52.7	51.4	49.3	45.6	41.6	38.5	35.5	30.9	31.8	33.5	22.1	20.5	20.1	21.4
10:00	52.2	52.7	51.7	52.5	51.6	49.0	45.2	40.8	38.0	33.6	32.0	32.6	34.5	26.0	26.2	21.6	21.6
11:00	52.8	53.6	52.9	53.9	52.4	49.9	46.6	43.5	39.3	35.6	32.0	29.5	32.5	26.8	28.1	22.7	21.9
12:00	51.1	52.4	51.0	51.6	50.2	47.7	44.0	39.4	35.8	32.5	30.1	28.9	30.9	26.7	27.6	22.9	22.1
13:00	51.5	52.2	50.7	51.3	49.6	47.1	43.8	39.6	35.9	32.7	30.5	30.0	31.7	27.6	29.0	23.6	22.2
14:00	51.8	51.9	50.4	51.1	48.9	46.6	43.6	39.7	36.0	32.9	31.0	31.1	32.6	28.6	30.4	24.3	22.2
15:00	51.6	52.2	50.7	51.2	49.0	46.7	43.6	39.8	36.4	33.6	32.4	32.3	31.9	27.7	28.7	29.3	22.0
16:00	53.1	52.8	51.2	51.5	49.5	47.2	44.3	41.2	38.8	36.6	35.8	36.3	33.9	27.4	27.8	27.9	21.9
17:00	56.3	55.3	54.6	53.5	51.7	49.6	44.8	40.4	37.7	35.8	37.6	35.4	31.6	25.3	25.8	22.1	21.9
18:00	58.8	59.2	56.3	56.6	54.7	51.6	46.7	41.3	36.6	33.5	39.7	34.6	25.4	24.2	25.9	21.5	22.0
19:00	55.6	55.8	54.3	55.0	51.8	48.3	45.2	40.5	35.8	34.0	42.9	34.9	24.8	25.9	28.6	22.4	22.1
20:00	55.1	55.7	53.5	53.6	51.2	48.0	44.1	39.8	36.3	34.7	40.5	30.0	24.7	24.9	27.1	21.9	21.9
21:00	54.8	54.8	52.5	53.3	51.0	47.5	43.6	39.3	35.2	34.3	37.6	26.0	23.1	23.1	24.8	21.1	21.7
22:00	54.4	55.0	52.5	52.6	50.0	46.4	42.6	38.1	37.3	35.3	36.9	21.8	21.2	22.4	24.0	20.9	21.7
23:00	54.2	53.6	51.4	52.1	49.6	46.1	42.2	37.8	36.0	34.0	33.4	20.8	20.6	21.1	22.9	20.6	21.5
avrg.	**54.6**	**54.7**	**53.0**	**53.2**	**51.1**	**48.3**	**44.5**	**40.2**	**36.8**	**34.1**	**35.4**	**30.9**	**29.6**	**24.5**	**25.5**	**22.8**	**21.7**

Octave Band Frequency Analysis

To calculate a dB(A), weight each octave band level accordingly and then logarithmically add each band together. dB(A) is a weighted broadband level which approximates the ear's sensitivity to different frequencies. The weightings are as below: {-26.2, -16.1, -8.6, -3.2, 0, 1.2, 1, -1.1} (from 63 to 8k)

LA=10*log10(sum(10^((Ln-Wn)/10))) where n=each octave band, L = level and W = weighting.

The octave band centre frequencies are 31.5, 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hz.

These formulas are used for creation of Tables 9a, 9b and 10 values, when translating from the given dB to dBA.

Table 9a- Vensys turbine and IL PCB octave band dB versus dBA

Vensys Octave band											
31.5	63	125	250	500	1000	2000	4000	8000	HZ		SUM
85	87.46	94.35	97.68	96.55	96.23	94.01	89.72	78.15	dB	at7m/s	103.36
-39	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	adjustment		
46	**61.26**	**78.25**	**89.08**	**93.35**	**96.23**	**95.21**	**90.72**	**77.05**	**dBA**		**100.71**

Table 9b- Vensys turbine and IL PCB octave band dB versus dBA

IPCB Limits											
31.5	63	125	250	500	1000	2000	4000	8000	HZ		SUM
69	67	62	54	47	41	36	32	32	dB		71.72
-39	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	adjustment		
30	**40.8**	**45.9**	**45.4**	**43.8**	**41**	**37.2**	**33**	**30.9**	**dBA**		**51.19**

Above in tables 9a and 9b are the Vensys turbine and IL PCB night time limits by octave band in both dB and a dBA equivalent. These values are then used to calculate the results in Table 10 which have the IL PCB limits at the top of the table and below by receptor is listed the octave band frequency contribution from the turbine. The third column is a subtraction of the generator dBA (100.71 dBA in above table 9) from the residence modeled dBA in column 2. The column two value is then used to calculate the ILPCB compliance amount in Column 4, where it is subtracted from the IL PCB dBA amount of 51.19dBA to give an amount of dBA by which the Illinois limit exceeds what the turbine will produce at each location.

Work Table 10	(Delta)			Freq. (HZ)	31.5	63	125	250	500	1000	2000	4000	8000
Dwelling ID	**Noise prediction (dB(A))**	Generator – WF(at House) [dBA]	IPCB Compliant by tot. dBA	IPCB Compliant by Octave	**30**	**40.8**	**45.9**	**45.4**	**43.8**	**41**	**37.2**	**33**	**30.9**
1	37.18	63.53	**14.01**	Y	-17.53	-2.27	14.72	25.55	29.82	32.70	31.68	27.19	13.52
2	37.34	63.37	**13.85**	Y	-17.37	-2.11	14.88	25.71	29.98	32.86	31.84	27.35	13.68
3	37.68	63.03	**13.51**	Y	-17.03	-1.77	15.22	26.05	30.32	33.20	32.18	27.69	14.02
4	37.38	63.33	**13.81**	Y	-17.33	-2.07	14.92	25.75	30.02	32.90	31.88	27.39	13.72
5	37.9	62.81	**13.29**	Y	-16.81	-1.55	15.44	26.27	30.54	33.42	32.40	27.91	14.24
6	37.56	63.15	**13.63**	Y	-17.15	-1.89	15.10	25.93	30.20	33.08	32.06	27.57	13.90
7	37.44	63.27	**13.75**	Y	-17.27	-2.01	14.98	25.81	30.08	32.96	31.94	27.45	13.78
8	37.05	63.66	**14.14**	Y	-17.66	-2.40	14.59	25.42	29.69	32.57	31.55	27.06	13.39
9	36.26	64.45	**14.93**	Y	-18.45	-3.19	13.80	24.63	28.90	31.78	30.76	26.27	12.60
10	35.58	65.13	**15.61**	Y	-19.13	-3.87	13.12	23.95	28.22	31.10	30.08	25.59	11.92
11	34.87	65.84	**16.32**	Y	-19.84	-4.58	12.41	23.24	27.51	30.39	29.37	24.88	11.21
12	34.35	66.36	**16.84**	Y	-20.36	-5.10	11.89	22.72	26.99	29.87	28.85	24.36	10.69
13	33.76	66.95	**17.43**	Y	-20.95	-5.69	11.30	22.13	26.40	29.28	28.26	23.77	10.10
14	32.13	68.58	**19.06**	Y	-22.58	-7.32	9.67	20.50	24.77	27.65	26.63	22.14	8.47
15	32.13	68.58	**19.06**	Y	-22.58	-7.32	9.67	20.50	24.77	27.65	26.63	22.14	8.47
16	32.06	68.65	**19.13**	Y	-22.65	-7.39	9.60	20.43	24.70	27.58	26.56	22.07	8.40
17	32.25	68.46	**18.94**	Y	-22.46	-7.20	9.79	20.62	24.89	27.77	26.75	22.26	8.59
18	32.08	68.63	**19.11**	Y	-22.63	-7.37	9.62	20.45	24.72	27.60	26.58	22.09	8.42
19	32.07	68.64	**19.12**	Y	-22.64	-7.38	9.61	20.44	24.71	27.59	26.57	22.08	8.41
20	31.76	68.95	**19.43**	Y	-22.95	-7.69	9.30	20.13	24.40	27.28	26.26	21.77	8.10
21	33.86	66.85	**17.33**	Y	-20.85	-5.59	11.40	22.23	26.50	29.38	28.36	23.87	10.20
22	32.81	67.90	**18.38**	Y	-21.90	-6.64	10.35	21.18	25.45	28.33	27.31	22.82	9.15
23	32.73	67.98	**18.46**	Y	-21.98	-6.72	10.27	21.10	25.37	28.25	27.23	22.74	9.07
24	34.68	66.03	**16.51**	Y	-20.03	-4.77	12.22	23.05	27.32	30.20	29.18	24.69	11.02
25	33.35	67.36	**17.84**	Y	-21.36	-6.10	10.89	21.72	25.99	28.87	27.85	23.36	9.69
26	34.01	66.70	**17.18**	Y	-20.70	-5.44	11.55	22.38	26.65	29.53	28.51	24.02	10.35
27	34.76	65.95	**16.43**	Y	-19.95	-4.69	12.30	23.13	27.40	30.28	29.26	24.77	11.10
28	35.13	65.58	**16.06**	Y	-19.58	-4.32	12.67	23.50	27.77	30.65	29.63	25.14	11.47
29	39.45	61.26	**11.74**	Y	-15.26	-0.00	16.99	27.82	32.09	34.97	33.95	29.46	15.79

Table 10-Receptor versus IL PCB limits by octave band

The compliance summary information is shown in Table 11 on the next page.

Table11 - Compliance Summary Information (Dwellings sorted by predicted noise level)

Rank #	Dwelling ID	Modeled Noise prediction (dB(A))	IPCB Compliant Y/N	Notes and Comments
1	29	39.45	Y	Full Compliance with the IPCB Standard
2	5	37.9	Y	Full Compliance with the IPCB Standard
3	3	37.68	Y	Full Compliance with the IPCB Standard
4	6	37.56	Y	Full Compliance with the IPCB Standard
5	7	37.44	Y	Full Compliance with the IPCB Standard
6	4	37.38	Y	Full Compliance with the IPCB Standard
7	2	37.34	Y	Full Compliance with the IPCB Standard
8	1	37.18	Y	Full Compliance with the IPCB Standard
9	8	37.05	Y	Full Compliance with the IPCB Standard
10	9	36.26	Y	Full Compliance with the IPCB Standard
11	10	35.58	Y	Full Compliance with the IPCB Standard
12	28	35.13	Y	Full Compliance with the IPCB Standard
13	11	34.87	Y	Full Compliance with the IPCB Standard
14	27	34.76	Y	Full Compliance with the IPCB Standard
15	24	34.68	Y	Full Compliance with the IPCB Standard
16	12	34.35	Y	Full Compliance with the IPCB Standard
17	26	34.01	Y	Full Compliance with the IPCB Standard
18	21	33.86	Y	Full Compliance with the IPCB Standard
19	13	33.76	Y	Full Compliance with the IPCB Standard
20	25	33.35	Y	Full Compliance with the IPCB Standard
21	22	32.81	Y	Full Compliance with the IPCB Standard
22	23	32.73	Y	Full Compliance with the IPCB Standard
23	17	32.25	Y	Full Compliance with the IPCB Standard
24	14	32.13	Y	Full Compliance with the IPCB Standard
25	15	32.13	Y	Full Compliance with the IPCB Standard
26	18	32.08	Y	Full Compliance with the IPCB Standard
27	19	32.07	Y	Full Compliance with the IPCB Standard
28	16	32.06	Y	Full Compliance with the IPCB Standard
29	20	31.76	Y	Full Compliance with the IPCB Standard

Table 12 shows the detailed comparison of the modeled turbine noise level at Dwelling 29 and the ambient noise level at Dwelling 29 (Site2).

Table 12	[Hz]	31.5	63	125	250	500	1000	2000	4000	8000	SUM
Vensys Noise at Dwelling ID-29	[dBA]	-15.26	0.00	16.99	27.82	32.09	34.97	33.95	29.46	15.79	39.43
The Turbine Noise may be audible	Y/N	N	N	N	N	N	N	N	N	N	L90
Ambient Noise by Hour (site2)	[00:00]	59.4	59.1	51.2	52.1	56.0	54.9	47.0	37.9	25.8	47.7
	1:00	60.4	58.9	51.6	52.3	57.7	55.8	47.9	36.5	26.1	46.3
	2:00	59.6	58.2	50.3	51.2	56.9	54.7	46.5	34.9	23.9	46.3
	3:00	62.9	59.7	52.9	54.4	58.6	56.1	47.5	35.1	26.6	48.1
	4:00	61.1	60.0	52.2	55.6	59.1	56.7	47.9	34.7	25.7	48.7
	5:00	61.9	61.1	53.5	53.8	59.0	57.5	49.2	35.3	23.4	52.1
	6:00	63.1	61.9	56.4	56.3	60.9	59.9	52.6	41.6	31.5	56.4
	7:00	63.1	63.8	57.6	55.4	60.5	60.4	53.8	41.9	35.8	59.7
	8:00	63.2	63.2	57.8	55.1	58.3	57.7	51.5	41.7	34.0	56.4
	9:00	62.9	63.0	57.0	53.4	56.2	56.7	51.3	40.7	35.9	54.3
	10:00	62.3	62.8	57.5	53.1	56.2	56.7	50.9	40.1	37.0	54.5
	11:00	62.8	64.7	59.9	55.7	57.1	57.9	52.2	41.4	35.0	54.9
	12:00	61.9	63.3	56.7	52.6	55.6	55.8	49.6	38.2	33.9	52.9
	13:00	62.3	63.3	56.3	52.2	55.6	55.4	49.3	38.4	34.9	52.6
	14:00	62.6	63.3	55.8	51.7	55.6	55.0	48.9	38.6	35.8	52.3
	15:00	63.0	63.7	56.1	52.0	55.6	55.2	49.0	39.2	35.9	52.9
	16:00	63.1	63.4	56.3	53.9	57.0	55.6	49.7	42.1	38.6	53.0
	17:00	61.7	62.6	55.4	52.0	59.4	58.2	51.2	41.9	37.2	54.7
	18:00	62.6	63.6	57.5	54.7	62.4	60.7	53.1	42.1	35.4	57.2
	19:00	62.1	62.4	55.8	54.2	59.4	58.6	50.5	44.1	35.8	56.8
	20:00	61.7	61.4	54.5	54.0	59.0	57.7	49.9	42.7	32.0	55.6
	21:00	61.8	61.5	55.4	54.8	58.5	57.2	49.4	40.7	29.1	54.8
	22:00	61.1	60.8	53.5	54.2	58.3	56.6	48.4	41.4	26.6	52.8
	23:00	61.3	61.2	52.5	53.2	57.6	55.9	48.0	39.4	25.6	50.5
											54.2

Turbine Noise is Below the Ambient Noise Level

The green numbers show the frequency by hour values where the turbine noise is below the ambient.

Summary of Results

Based on the modeled turbine noise levels and the performed analysis we found that no residences exceed the IL PCB limits, with the highest predicted levels at residence number 29, which is the residence along 300N rd near the pond and I-57. All other receptors are compliant for the night time IL PCB limits for all octave band frequencies (see Table 10 and Table 11). Residence 29 is the one residence that is closest to the interstate, the 24hr ambient noise measurement report has the octave band and L90 values for this residence and shows that the turbine noise will be much below the ambient noise in each of the hourly 1 octave bands (see Table 12). The analysis also shows that the turbine noise level will be at all times significantly below the L90 levels (on average 10dBA below). This means that the turbine noise will most likely be not audible from receptor 29 or any other receptor.

Conclusion

Based on the background measurements, the Vensys turbine octave band values in Table 3, the Illinois PCB allowable night time octave band sound power levels limits in Table 2 and the turbine noise estimates previously modeled in WindFarmer, WES Engineering came to the conclusions presented below.

The estimates of the turbine impact on the noise level at the dwellings is very conservative because of one main factor, the turbine noise level used in the model is the maximum noise that is produced at 7-8 m/s wind speed at hub height and it was used in all of the time intervals. In the measured 24h time period only less than 3h (<12%) of the wind was around 7 m/s. It will usually be below the 7m/s wind speed.

Based on this conservative study, all of the Dwellings/Receptors comply with the IL PCB standard. The ambient noise level at receptor #29, #28 and South of Receptors #1-8 was measured, and shows that the turbine noise will be on average 10dBA below the L90 levels at all these locations. Also the turbine noise does not exceed any of the hourly 1 octave ambient noise levels.

We concluded that the turbine will not contribute significantly to the existing ambient noise at any of the studied receptors.

References

Kamperman G.W. and R. R. James. 2009. Guidelines for selecting wind turbine sites. Sound and Vibration: 8-12. July. http://www.sandv.com/home.htm.

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.

Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D.M., McCunney, R.J., Seilo, M.T., Sondergaard, B. 2009. Wind Turbine Sound and Health Effects An Expert Panel Review. Prepared for AWEA and CanWEA.

Attachment D-8
Libman Wind Shadow Flicker Study

WES Engineering Inc.

706 S. Orchard St, Madison, WI 53715, Ph#608-259-9304 WWW.WESENGINEERING.COM

Libman Wind Shadow Flicker Study

(Vensys turbine on 62m tall tower installed in Geneseo IL)

October 28, 2010

WES Engineering Inc.
706 S. Orchard St
Madison, WI 53715
www.WESengineering.com
608-259-9304 ph
608-299-0426 fax
Wes Slaymaker, P.E.
President

Setbacks

The Libman wind turbine project site is shown below in Figure 1.

Figure 1- Libman turbine and setbacks

Figure 1 shows a 1.1X (450') total turbine height ring around the turbine location that is currently planned for placement of the wind turbine. The location is located far enough from the existing Libman buildings to accommodate later plans to expand buildings North. AutoCAD drawings of the site have been obtained and a full civil site plan is being developed by a Civil Engineer that shows details of the turbine and road and underground wire locations. This report is addressing issues with the community in regards to turbine location and its shadow flicker and noise impacts in the area. The last concern for setbacks is in regards the "ice fall" setback to be sure falling ice from the structure in winter does not harm any people or equipment. Figure 1 shows a 1000 foot setback ring around the preferred turbine location with a blue circle, and demonstrates the setback is more than sufficient to keep ice fall away from areas where people might be in the winter time, and not affecting any buildings. The conservative setback for ice "throw" reasons is 1.5X (turbine hub height plus rotor diameter)= 1.5 X (279' + 253') = 797' . The "exclusion zone" is the smallest distance and is equal to 110% of the blade length or 139'.

Shadow Flicker Background

Shadow flicker from wind turbines is defined as alternating changes in light intensity caused by shadows cast from moving turbine blades. Shadow flicker can only occur when a particular combination of conditions coincide at a specific location, time of day, and time of year. A location that may be sensitive to shadow flicker, such as a dwelling is referred to as a shadow receptor.

For shadow flicker to occur, the sky must be clear, and the turbine must be operating, otherwise no moving shadows are cast. For shadow flicker to occur at the location of a shadow receptor, the turbine rotor must be located in the line of sight from the receptor to the sun. Furthermore, for the shadow flicker to be visible, the change in light intensity must be above the level of perception of the human eye.The distance between a wind turbine and a receptor affects the intensity of the flickering. Shadow flicker intensity decreases with greater separation from the receptor to the turbine, up to a point where the change in light intensity is below what the human eye can distinguish. Shadows cast close to a turbine are more intense, distinct and "focused" because a greater proportion of the sun is intermittently blocked by the passing blades. As separation between the receptor and the turbine increases, the proportion of the sun that is blocked decreases and the shadows become less intense and less discernible. Shadow flicker intensity is also significantly reduced if the plane of the rotor is at an angle other than perpendicular to the line of sight from the receptor to the sun, again because a smaller proportion of the sun is blocked by the passing blades. Ambient lighting conditions also affect the visibility of shadow flicker. Changing light intensity is more noticeable in a darkened room than outdoors where ambient light levels are higher.

The normal maximum distance used for modeling shadow flicker is approximately 3280 feet (1000m) from the turbine(s). At distances beyond 1000m the changing light intensity is low enough that a person does not perceive the turbine rotor as "chopping" through the sun, but rather as an object with the sun behind it. Shadow flicker is only discernible at distances beyond 1000m in rare circumstances such as in a darkened room with a single window facing the turbine.

The frequency or speed of the flickering is related to the rotor speed and number of blades on the turbine. Modern utility sized turbines are typically 3-bladed with rotor speeds below 20 RPM. This translates to blade passing frequencies less than 1 Hz or 1 cycle per second. At these low frequencies, shadow flicker does not pose a health threat. The Epilepsy Foundation states that frequencies below 3Hz do not cause seizures in people with photosensitive epilepsy.

Generally shadow flicker occurs during clear sky conditions, when the sun is low on the horizon, either at sun rise or sun set. As the elevation of the sun in the sky changes throughout the year, the location of the shadow flicker also changes, so a specific shadow receptor is only affected at certain times of day and at certain times of year. By considering the spatial relationship between the turbines and the receptors (geographic locations and ground elevations) as well as the geometry of the turbines (hub height and rotor size), the occurrence of shadow flicker can be accurately modeled and predicted to within a few minutes at any location around the turbine(s).

Modeling Approach

The Garrad Hassan WindFarmer software, which is a wind plant design software package, was used to model and assess the shadow flicker for the Libman project. The WindFarmer shadow flicker model determines a theoretical maximum amount of shadow flicker, in total hours of flicker per year, at any point up to the maximum specified calculation distance from the turbines. By defining specific shadow receptor locations, the model can also determine the time of day, day of year, and duration for every possible occurrence of shadow flicker at a receptor.

The shadow flicker model uses the following inputs:

- Geographic location of the wind plant (latitude and longitude)
- Turbine location (coordinates)
- Receptor locations (coordinates)
- Digital terrain map (ground elevation data)
- Turbine geometry (hub height and rotor diameter)

The amount of shadow flicker determined by the model is a theoretical maximum or “worst case”
amount due to the following set of implausible conditions:

- Every day is sunny and cloudless
- The turbines are always operating
- The rotor plane is always perpendicular to the line of sight from the receptor to the sun
- There are no obstacles such as trees or walls between the receptors and the turbines
- The limits of human perception of changing light intensity are not considered

The theoretical maximum hours of shadow flicker per year can then be de-rated to be statistically representative of actual conditions using the following climatological data:

- Wind speed frequency distribution
- Directional wind distribution
- Sunshine hours from long term monthly reference data

The de-rated hours of shadow flicker per year are still conservative as there is no consideration given to the presence of blocking obstacles or the intensity of the flicker.

Shadow Flicker Modeling

Below in Figure 2 is the modeled shadow flicker from a turbine that has 77m rotor and 85m tower (the current proposed Vensys 1.5MW turbine). The modeling is done by Windfarmer software assuming maximum number of hours per year (turbine is always operating, sun is always shining). The real number of shadow flicker hours will be less than what is shown. The maximum shadow flicker hours at any residence is 68 hours per year at receptor #1 (see Figure 3 for numbered receptors), and below 15 actual hours per year (based on reductions for cloudy days, blade orientation and days with not enough wind to turn the turbine). A separate section below details the calculation of actual hours using all the above listed factors. The next highest hours was 67 hours at receptor #28. A separate detailed Windfarmer output of hours of impact is attached as Appendix A, and gives the date and time of shadow flicker at a number of residences closest to the turbine, residence label numbers on the below map correspond with those in the report.

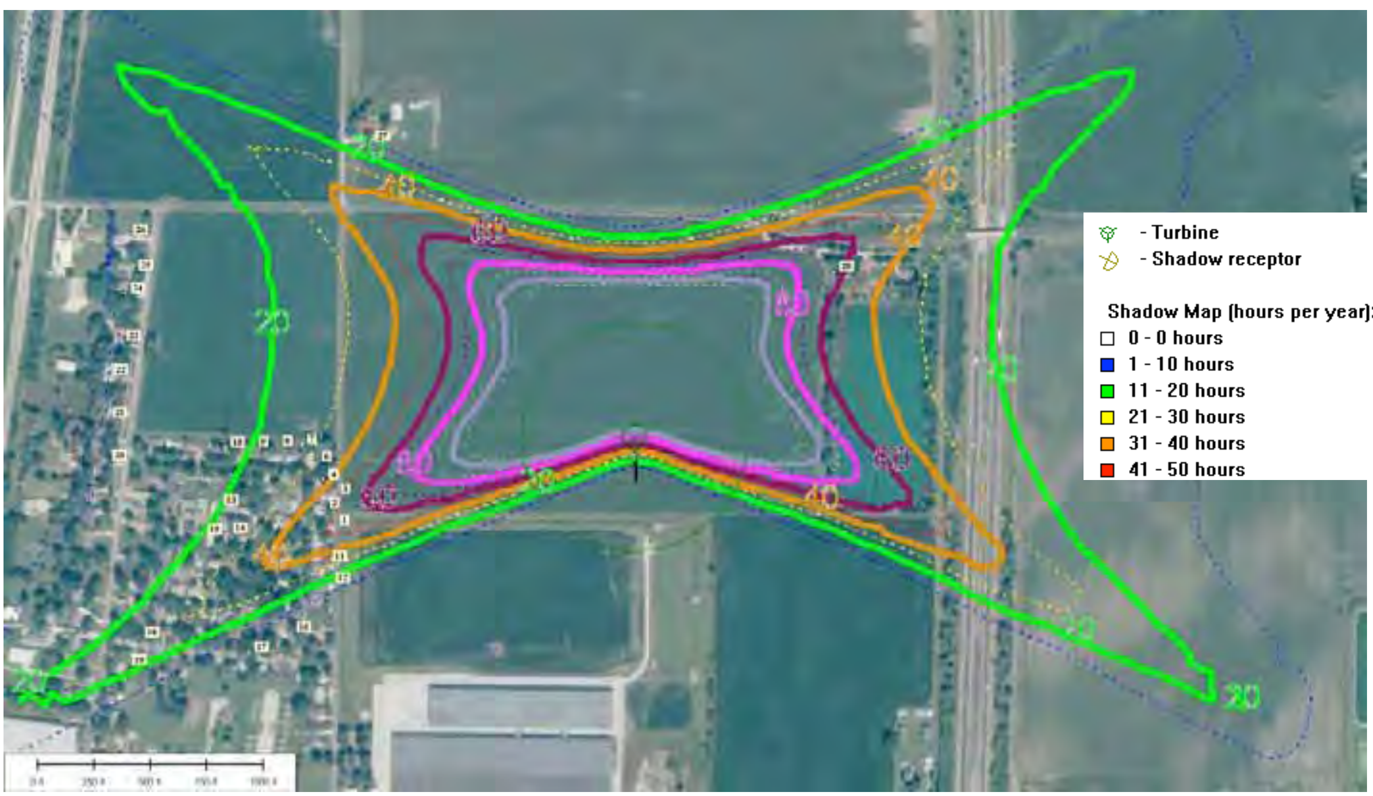


Figure 2- Shadow Flicker Map

Figure 3- Shadow Flicker Map- zoom in

There is a zone of shadow flicker shown over the residential area west of the turbine, but likely most of these residences will not experience any shadow flicker as the months of flicker occur from May to August when leaves will shade much of the area. The time of shadow flicker is early morning from 5:40am to 6:30am. The Libman company has a row of evergreen trees along the southwest property edge, which can reduce or eliminate shadow flicker at any nearby residences when the trees are at a height of 39’. There are currently a row of trees along the West side that needs to be extended North. This could be accomplished with an approximate 750’ row of trees on the West side and 175’ row of trees on the Northeast side of the property. Using geometry the tree heights of 39’ removes the shadow completely from the residences along the West edge of the project.

Shadow Flicker- Reduction in Hours due to Cloudiness, Wind Direction, Turbine Not Operating, and Obstacles

The consultant has provided in the next section of the report a detailed calculation for the reduction in theoretical maximum shadow flicker hours for various environmental factors and obstacles. The reductions are large with most residences having more than 70% reduction in hours. Refer to Figure 3 above for map with receptors labeled 1 to 28. The below Table shows the summary of the reductions, and the following pages describe the methods used to calculate these reductions. The three first reduction items, cloudiness, too low/high winds and wind direction are climate dependent and vary from year to year. The values in the table are an average value, not what will be experienced in every year. In each detailed section the variability of that reduction will be discussed.

Receptor ID	X	Y	Total Maximum Shadow Flicker/y	Reduction for Cloudiness	Reduction for Too Low/High Wind	Reduction for Wind Direction	Reduction for obstacles	Total Realistic Shadow Flicker h.
1	388352	4394332	68	38.3%	15.0%	42.9%	95.0%	1.0
2	388338	4394355	44	40.8%	13.2%	45.4%	70.0%	3.7
3	388353	4394374	43	40.8%	13.2%	45.4%	55.0%	5.4
4	388337	4394393	35	40.8%	13.2%	49.3%	80.0%	1.8
5	388336	4394394	34	40.8%	13.2%	49.3%	80.0%	1.8
6	388328	4394417	31	41.0%	11.3%	47.2%	65.0%	3.0
7	388308	4394441	25	44.2%	11.2%	51.1%	40.0%	3.6
8	388275	4394438	24	39.6%	12.8%	46.0%	80.0%	1.4
9	388242	4394437	20	39.6%	12.8%	46.0%	90.0%	0.6
10	388204	4394436	17	39.6%	12.8%	47.2%	95.0%	0.2
11	388342	4394283	39	39.1%	14.8%	39.0%	0.0%	12.3
12	388346	4394254	13	36.1%	19.0%	38.0%	0.0%	4.2
13	388195	4394359	19	43.6%	10.7%	48.0%	80.0%	1.0
14	388208	4394321	22	40.8%	13.2%	45.4%	90.0%	0.6
15	388173	4394319	18	40.8%	13.2%	45.4%	90.0%	0.5
16	388293	4394188	0	0	0	0	0	0.0
17	388237	4394161	0	0	0	0	0	0.0
18	388089	4394180	28	39.1%	14.8%	39.0%	90.0%	0.9
19	388072	4394143	23	39.1%	14.8%	39.0%	90.0%	0.7
20	388045	4394419	11	44.2%	11.2%	51.1%	45.0%	1.5
21	388046	4394476	9	48.2%	9.8%	49.9%	15.0%	1.8
22	388047	4394533	10	45.7%	9.6%	47.2%	90.0%	0.3
23	388064	4394579	9	43.4%	9.4%	45.3%	60.0%	1.0
24	388070	4394643	11	51.3%	9.4%	36.7%	25.0%	2.3
25	388080	4394674	10	51.3%	9.4%	36.7%	25.0%	2.1
26	388074	4394722	9	47.9%	11.0%	27.0%	25.0%	2.3
27	388400	4394848	6	59.7%	8.5%	32.6%	10.0%	1.3
28	389025	4394672	67	54.4%	9.3%	40.7%	15.0%	14.0

Table 1-Summary table of reduced hours of flicker

Receptor ID	Total Realistic Shadow Flicker h.	Months with Turbine Shadow Flicker	Hours of Shadow Flicker (24h)
1	1.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
2	3.7	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
3	5.4	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
4	1.8	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,27
5	1.8	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,28
6	3.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,28
7	3.6	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,30
8	1.4	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,33
9	0.6	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,33
10	0.2	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,33
11	12.3	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,34
12	4.2	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,35
13	1.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,36
14	0.6	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,36
15	0.5	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,36
16	0.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,39
17	0.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,41
18	0.9	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,41
19	0.7	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,41
20	1.5	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,43
21	1.8	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,44
22	0.3	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,45
23	1.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,46
24	2.3	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,47
25	2.1	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,47
26	2.3	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,49
27	1.3	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,50
28	14.0	JFMAMJJASOND	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,51

Table 2-Summary table of months and hours of shadow effect at receptors

WES Engineering Inc.
706 S. Orchard St, Madison, WI 53715, Ph#608-259-9304 WWW.WESENGINEERING.COM

Reductions for Cloudiness

The below table 3 shows the average cloudiness days for a nearby larger Illinois community, Peoria, IL, and table 4 shows the average cloudiness at all National Weather recording sites in Illinois that collect cloudiness data. It was assumed the number of cloudy days at the project site in Arcola was similar to that of Peoria, based on the Table 4 averages for IL, and further East from Arcola, at Indianapolis the cloudy days are 179, and further West they are 167 at Springfield. 172 hours is an average between those two values. Only cloudy days were used for reductions, no partly cloudy days were used to reduce the flicker hours.

Summary										
	Temp. (ºF)	Relative Humidity (Percentage)		Extreme Temp. (Days Per Month)		Rain (Inches)	Cloudiness (Days Per Month)		
	Average	A.M.	P.M.	Below 32º	Above 90º	Average	Clear	Partly Cloudy	Cloudy
January	21.6	80%	71%	29	0	1.5	7	6	18
February	26.3	81%	68%	25	0	1.4	7	6	16
March	39.0	81%	64%	19	0	2.9	6	7	18
April	51.4	78%	58%	6	N/A	3.8	6	8	16
May	61.9	81%	59%	N/A	N/A	3.7	7	10	14
June	71.5	82%	59%	0	4	4.0	7	11	12
July	75.5	87%	62%	0	8	4.2	9	12	10
August	73.1	89%	63%	0	5	3.1	10	10	10
September	66.1	87%	61%	N/A	2	3.9	11	9	10
October	54.0	84%	60%	4	N/A	2.7	11	8	12
November	41.2	83%	68%	17	0	2.7	7	6	17
December	27.0	83%	73%	27	0	2.4	7	6	19
Annual	**50.7**	**83%**	**64%**	**127**	**20**	**36.3**	**95**	**97**	**172**

Table 3- Cloudiness average table for nearby IL community

The method used to breakdown the number days of clear, partly cloudy, and cloudy days, for the few sites in Illinois with long-term observations is the following:

Hourly weather observations of cloud types and coverage (in tenths) are combined into daily values. The daily average sky cover is assigned to three classes. Daily average sky cover ranging from 0 to 3 tenths is considered "clear". Daily average sky cover from 4 to 6 tenths is considered "partly cloudy", and from 7 to 10 tenths is considered "cloudy".

Cloudiness data can vary by +/- 15% by year and even greater percentages by month.

Number of clear, partly cloudy, and cloudy days for sites in Illinois.
Prepared by Jim Angel, state climatologist, Illinois State Water Survey, 2010.

DATA THROUGH 2009	YEARS		ANNUAL	
		CLEAR	PART CLDY	CLDY
CAIRO,IL	30	113	104	149
CHICAGO,IL	37	84	105	176
MOLINE, IL	62	101	100	164
PEORIA, IL	52	95	97	172
ROCKFORD, IL	45	93	98	174
SPRINGFIELD, IL	48	104	94	167

Data Source: http://www.ncdc.noaa.gov/oa/climate/online/ccd/clpcdy.txt

Table 4- Cloudiness average table for nearby IL community

Reductions for Too Low/Too High Winds

The turbine operates in wind speeds of 3 m/s (6.7 mph) to 22 m/s (49.2 mph), above or below these speeds the turbine controller rotates the blades to a “feathered” position and the rotor does not rotate until the wind speeds are once again within the above speed range. Below in Table 5 is the Vensys operating speed ranges given in the technical specifications.

Technical data VENSYS 70 / 77 / 82

Power	Cut-in wind speed	3 m/s
	Rated wind speed	13.5 m/s 13.0 m/s 13.0 m/s
	Cut-out wind speed	25 m/s 22 m/s 22 m/s
	Survival wind speed	59.5 m/s 52.5 m/s 52.5 m/s

Table 5- Vensys operating speeds table

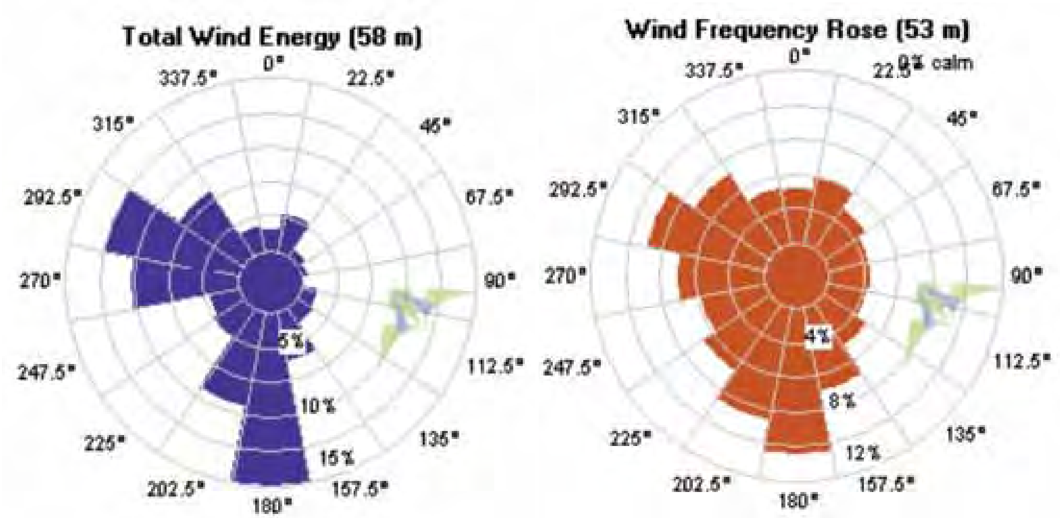
Below in Table 6 is the output table for the Libman wind turbine, and has a column of percentage of time, by month, when the turbine will not operate due to wind speeds outside the operating range. This table was computed using the wind speed data obtained from the Libman site for a year (October 2009 till October 2010). Most of the non-operating hours (>99%) are periods of too low winds, or icing conditions in winter, that stop the turbine. Monthly variability in too low/high speeds is +/- 15%.

Vensys-1.5 HH85-RD77	Valid Data	Hub Height Wind Speed	Time At Zero Output	Time At Rated Output	Mean Net Power Output	Mean Net Energy Output	Net Capacity Factor
Month	Points	(m/s)	(%)	(%)	(kW)	(kWh/yr)	(%)
Jan	4,296	7.29	**10.38**	9.29	565	420,340	37.7
Feb	4,018	6.83	**13.17**	6.99	465.3	312,695	31
Mar	4,464	7.33	**6.32**	8.53	534.2	397,435	35.6
Apr	4,320	8.12	**10.14**	17.25	662	476,629	44.1
May	4,464	7.08	**6.56**	6.29	475.8	353,994	31.7
Jun	4,320	5.81	**17.29**	1.34	319.3	229,879	21.3
Jul	3,744	5.1	**20.65**	0.4	220.7	164,227	14.7
Aug	4,464	5.66	**15.5**	0.25	293.8	218,592	19.6
Sep	4,320	6.82	**12.89**	2.36	482.7	347,558	32.2
Oct	1,842	7.16	**8.85**	5.54	519.1	386,207	34.6
Nov	4,272	7.81	**7.19**	8.66	633.5	456,102	42.2
Dec	4,454	8.1	**6.69**	11.47	655.5	487,719	43.7
Overall	48,978	6.94	11.28	6.65	486.9	4,265,666	32.5

Table 6- Vensys time at zero output and net output by month

Reductions for Wind Direction

The presence of a rotating shadow requires the turbine to be rotated in a direction perpendicular (or within a certain angled amount) to the path of the sun to the receptor. The wind measurement tower at the project site has recorded wind direction over a period of one year (October 2009-October 2010).



The site has two predominant wind directions, from due South, and from the northwest. The wind rose above labelled “Total Wind Energy” shows the frequency of wind direction by quadrant based on total energy content of the wind, and varies slightly from the wind rose labelled “Wind Frequency Rose”, which has the quadrants frequency based just on any measured time the wind vane pointed in that direction. There are some directions with a greater frequency of light winds.

The monthly variability of wind direction is larger than some of the other variables used to reduce shadow flicker hours, with the possibility that in some months the predominant wind direction may be 50-75% different than what is average, so the actual shadow reduction in any month due to turbine direction may vary considerably.

The reduction for wind direction was computed by figuring a reduction by month and then averaging the reduction amount for the months of the year when shadow flicker affects that residence. The monthly wind direction frequency is taken from a table obtained using the wind data from the on-site wind measurement tower. There are direction sensors at two heights on this tower, the 53m height sensor was used (being the highest direction sensor and more closely approximating the direction the turbine will face). The below figure 6 show’s graphically the wind direction percentages by month.

An example how consultant determined reduction in shadow flicker hours is given below for receptor #6, with a 47.2% wind direction reduction. This receptor has shadow flicker in the months of April, May, August, and September. For these four months the percentage of time the turbine would be turned to have the rotor plane parallel to the direction of the sun passing through it to the receptor is assigned a percentage reduction, directions 22.5 degrees off this axis were also included in the reduction. This is a conservative estimate, as there would also be some hours reduced for angles larger than 22.5 degrees off-axis, but this amount was chosen to be able to complete the results in an easy to calculate table.

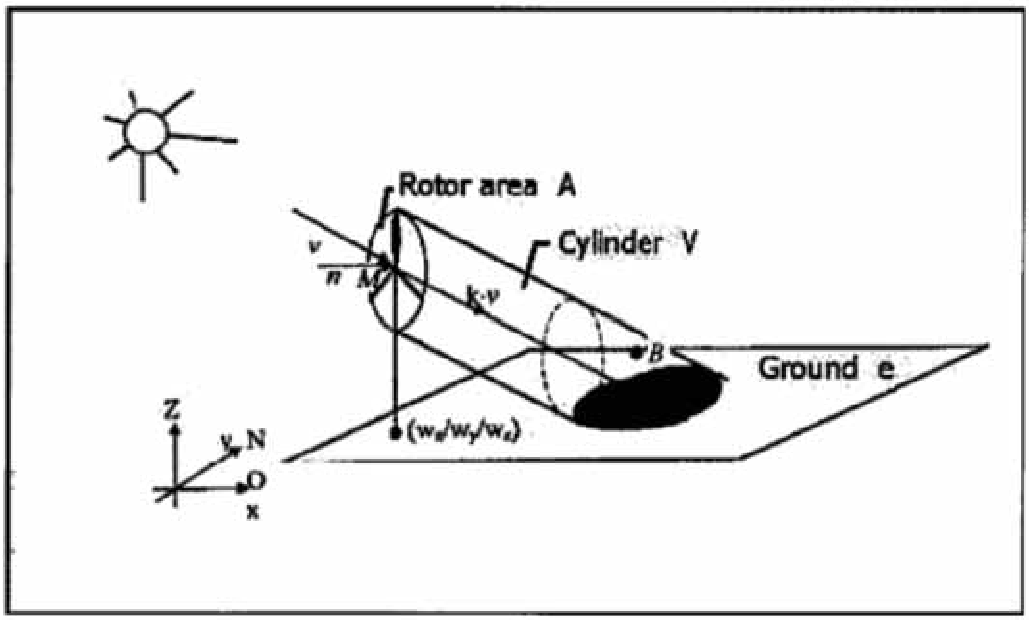


Diagram 1- Shadow Flicker area in relation to position of turbine and sun

Receptor ID	Reduction for Wind Direction	Receptor ID	Reduction for Wind Direction	Receptor ID	Reduction for Wind Direction
1	42.9%	11	39.0%	21	49.9%
2	45.4%	12	38.0%	22	47.2%
3	45.4%	13	48.0%	23	45.3%
4	49.3%	14	45.4%	24	36.7%
5	49.3%	15	45.4%	25	36.7%
6	47.2%	16	N/A	26	27.0%
7	51.1%	17	N/A	27	32.6%
8	46.0%	18	39.0%	28	40.7%
9	46.0%	19	39.0%		
10	47.2%	20	51.1%		

Table 7- Reductions for wind direction by receptor

Figure 6- Monthly wind roses

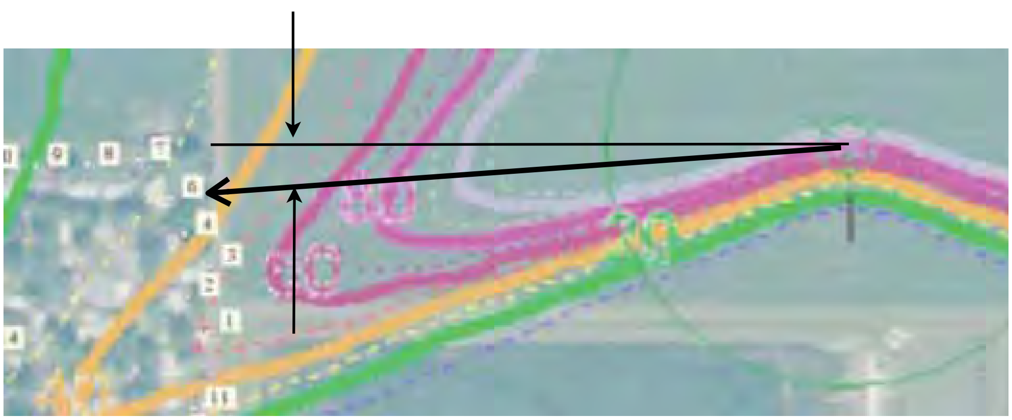


Diagram 2- Receptor 6 and angle of shadow flicker from horizontal

Using Receptor 6 as the example, the sun's position while creating a shadow flicker for this receptor is approximately 85 degrees using 0 degrees as North and 180 degrees as South.

The turbine percentages in the month of flicker over receptor 6 are reduced by summing the percentage by direction sectors within 22.5 degrees of perpendicular to suns' location (so 175 degrees +/- 22.5 degrees and 355 degrees +/- 22.5 degrees). In the month of April highlited in yellow below are the quadrants to remove, summing 53.47%, for May it is 42%, for August, 54.66% and September 38.57%. The average reduction for the whole year is 47.17%.

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Direction Sector Midpoint (deg.)	Frequency (%)											
0	1.61	3.15	17.63	3.50	5.287	2.64	5.53	5.04	4.47	14.28	1.147	2.043
22.5	4.95	5.39	14.27	4.03	7.146	3.01	4.81	7.10	5.56	13.84	2.9963	1.145
45	6.81	2.81	8.89	4.88	5.444	3.15	4.14	6.36	4.38	0.38	6.6948	0.831
67.5	4.46	6.30	3.16	3.54	6.564	3.03	4.27	5.67	2.71	0.76	7.7949	1.033
90	1.99	6.37	3.16	2.71	5.914	3.03	5.18	4.26	4.42	0.54	4.471	7.6111
112.5	1.17	4.65	3.63	3.75	6.743	2.01	3.71	4.61	4.19	1.03	5.6882	7.364
135	1.94	2.92	7.28	4.14	8.356	4.70	4.73	6.85	5.05	2.12	5.7116	3.323
157.5	2.10	2.66	5.60	7.45	7.818	9.88	8.47	10.06	4.79	3.04	9.9251	6.848
180	2.59	1.91	8.18	20.67	8.714	11.00	11.51	15.37	10.72	2.06	12.032	13.49
202.5	9.07	1.01	2.71	11.27	7.863	12.80	12.55	7.80	9.35	2.23	12.149	9.722
225	5.65	0.62	4.35	7.38	4.503	12.34	12.77	3.74	6.39	6.24	5.9223	8.913
247.5	5.85	1.24	3.09	4.47	4.1	8.75	6.81	2.78	6.74	17.92	7.3268	6.78
270	13.08	14.37	2.49	4.21	4.727	6.92	5.53	1.39	7.50	9.28	5.1498	12.33
292.5	23.55	26.43	1.90	5.46	6.026	6.88	2.32	1.70	13.01	7.49	5.4541	8.689
315	12.23	15.30	4.28	5.97	5.623	5.72	3.39	7.97	7.06	12.00	3.6517	7.23
337.5	2.95	4.88	9.39	6.55	5.175	4.14	4.27	9.30	3.68	6.79	3.8858	2.649

Table 8- Wind direction by frequency and month for Libman site at 53m height AGL, yellow highlights for receptor 6 example of directions to remove hours.

Reductions for Obstructions

The last reduction is for obstructions to the shadow due to trees. No other tall obstacles exist in the project area that would obstruct the rotating shadow for the 28 receptor locations studied. The calculation of reduction on hours due to obstructions was based first on assessing the type of obstruction (deciduous or conifer tree) versus the time of year of the shadow flicker. For the receptors with shadow flicker hours in the "leaf on" months from May through October there is assumed obstruction by that tree to its full height. Tree heights were estimated using detailed site photographs taken from the turbine location towards the obstructions, and the use of high resolution images, shown below in Figures 7, 8, and 9.

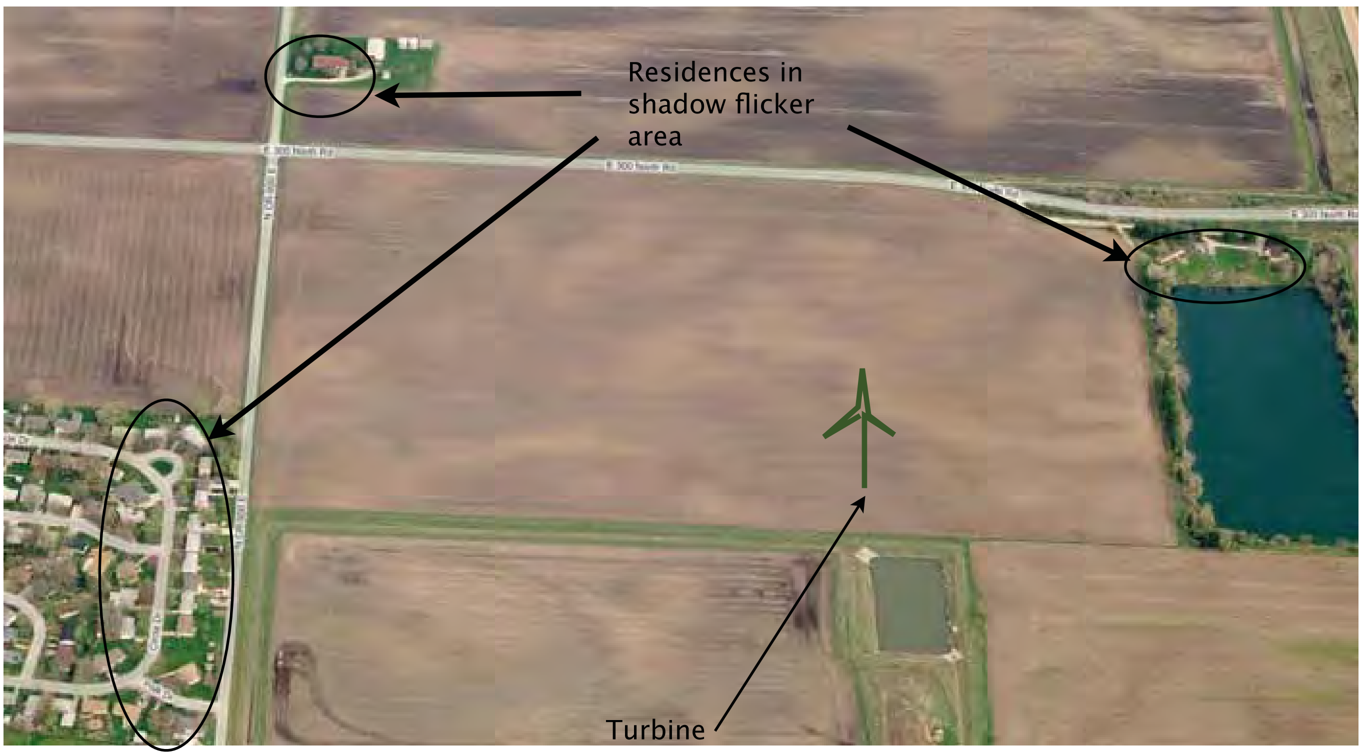


Figure 7- Area residences and Libman turbine location "birds eye" view

Figure 8- West residences "birds eye" view from East

Figure 9- West residences "birds eye" view from South- receptors labelled

Figure 10-airplane view Libman plant and neighborhood West- summer

On the next few pages are photos looking from the turbine location towards the receptors, in summer time with full leaf cover. The residences are labeled by the receptor numbers used in the Windfarmer shadow flicker modeling shown in figures 2 & 3. The height of the trees in front of these residences was used to calculate if there was an obstruction of the shadow flicker. It should be noted that all these residence have street addresses on Polk Ave and their is many times a garage or shed that faces the turbine. The residence with the largest predicted shadow hours is number 11, shown in photo #3, and the garage is the main “feature” on the East side of this residence.

The percentage obstruction is determined by the percentage of the view of the residence blocked in the 1m (3.28’) to 2m (6.6’) height above ground level by a direct line of sight from the turbine rotor cylinder V (shown in diagram 1) to the residences, assessed in 5% increments. Pictures are not shown of any of the receptors that are not in the first row, as they are obscured by vegetation in the photos, and in all cases have obstruction percentages 80% or higher. Large photos are shown for receptors with more than 3.7 hours flicker per year, plus the top five receptors with highest theoretical shadow flicker hours (#’s 28, 11, 3, 12 and 2 in descending order).

Photo 1- Receptor 1

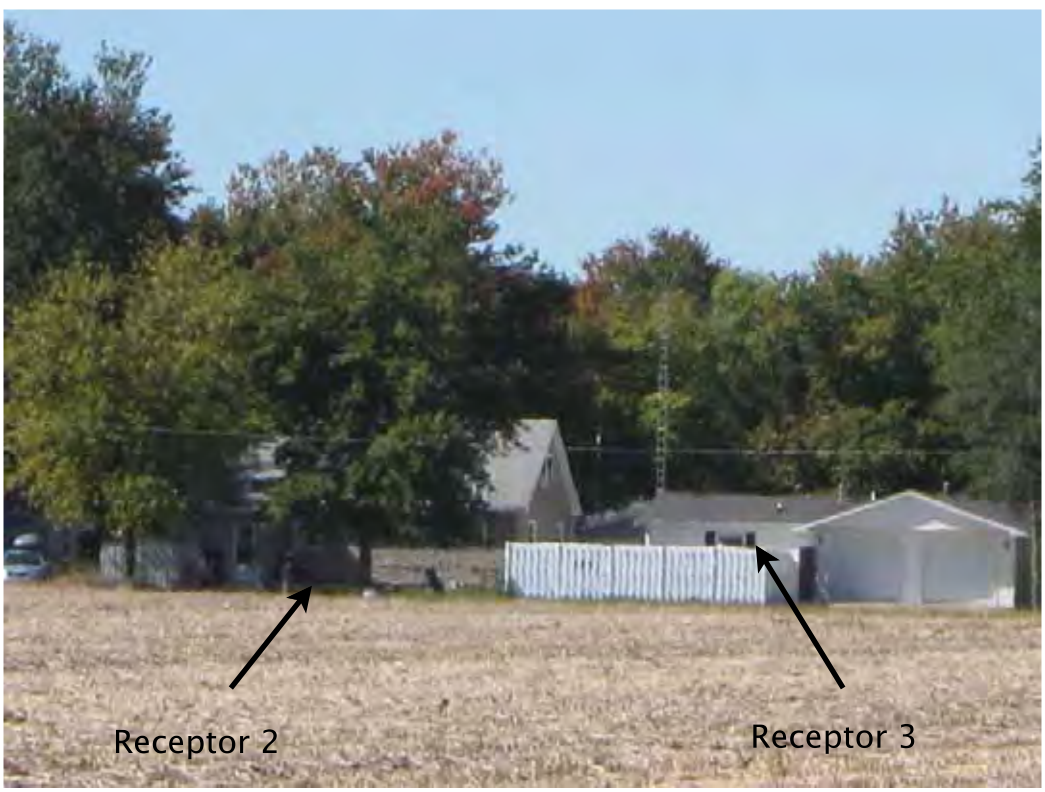


Photo 2- Receptor 2 & 3

Photo 3- Receptor 11 & 12

Photo 4- Receptor 28

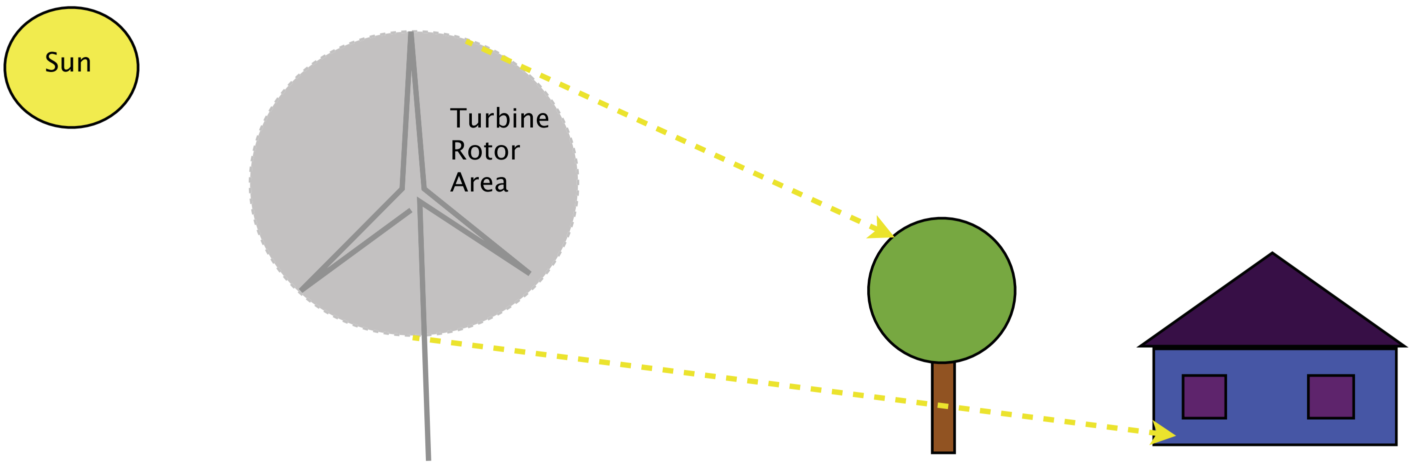


Diagram 3- Sun's path through turbine obstructed at receptor by a tree

Appendix A

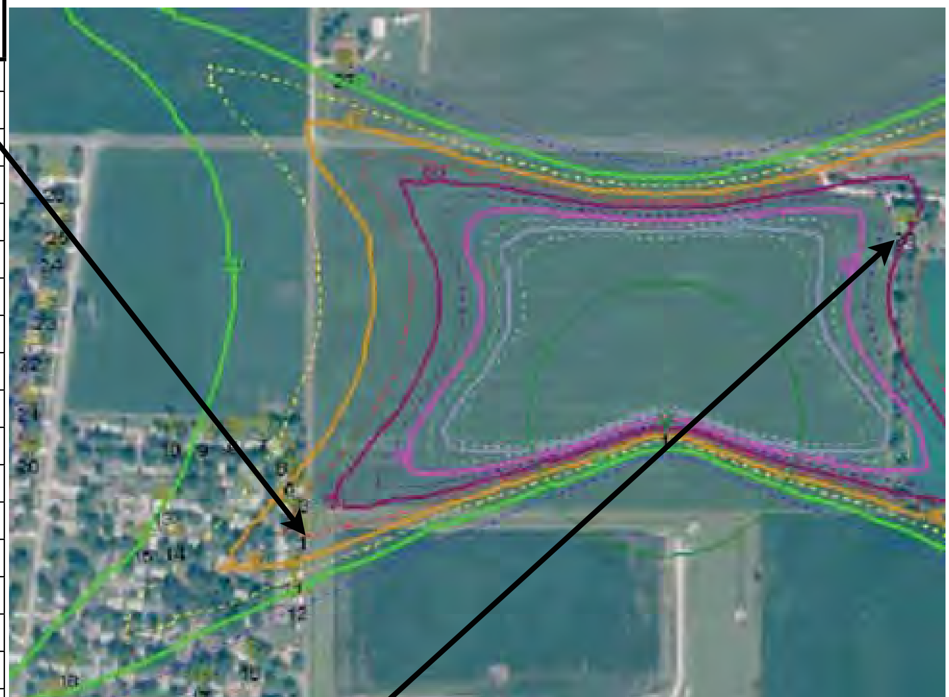
GH WindFarmer Report
Libman Noise Oct 27 2010

1 Shadow Flicker Data

WindFarmer Site Shadow Flicker Report 4.1.1.0
File name:Libman Windfarmer 25m shadow Oct 25 2010 C:\Documents and Settings\WES\My Documents\WES Engineering\Projects\Libman company\GIS\Libman Windfarmer 25m shadow Oct 25 2010.wow
Date: October 28, 2010

Latitude	39 deg 41 min	North
Longitude	88 deg 17 min	West
Calculation time interval	10	Min
Maximum distance from turbine	1000	m
Minimum sun elevation	3	deg
Year of calculation	2010	
Model the sun as a disc	No	
Consider distance between rotor and tower	Yes	
Turbine orientation	Rotor plane facing azimuth +180	
Terrain and visibility	Not considered	
Visibility line of sight algorithm checks every	10.0	m

Receptor ID	Max Hours Shadow Flicker
1	68
2	44
3	43
4	35
5	34
6	31
7	25
8	24
9	20
10	17
11	39
12	13
13	19
14	22
15	18
16	0
17	0
18	28
19	23
20	11
21	9
22	10
23	9
24	11
25	10
26	9
27	6
28	67



Shadow Summary Table

2 Project: Libman Wind

Number of shadow receptors: 28

Receptor ID:1

Height: 2m
Easting: 388352m
Northing: 4394332m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	68
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 135	50	05:30	06:20
02/05 122	10	05:50	06:00
03/05 123	10	05:50	06:00

04/05 124	20	05:50	06:10
05/05 125	30	05:40	06:10
06/05 126	30	05:40	06:10
07/05 127	30	05:40	06:10
08/05 128	30	05:40	06:10
09/05 129	30	05:40	06:10
10/05 130	30	05:40	06:10
11/05 131	30	05:40	06:10
12/05 132	30	05:40	06:10
13/05 133	30	05:40	06:10
14/05 134	40	05:30	06:10
15/05 135	50	05:30	06:20
16/05 136	50	05:30	06:20
17/05 137	50	05:30	06:20
18/05 138	50	05:30	06:20
19/05 139	50	05:30	06:20
20/05 140	50	05:30	06:20
21/05 141	50	05:30	06:20
22/05 142	50	05:30	06:20
23/05 143	50	05:30	06:20
24/05 144	50	05:30	06:20
25/05 145	50	05:30	06:20
26/05 146	50	05:30	06:20
27/05 147	50	05:30	06:20
28/05 148	50	05:30	06:20
29/05 149	50	05:30	06:20
30/05 150	50	05:30	06:20
31/05 151	40	05:40	06:20
01/06 152	40	05:40	06:20
02/06 153	40	05:40	06:20
03/06 154	40	05:40	06:20
04/06 155	40	05:40	06:20
05/06 156	40	05:40	06:20
06/06 157	40	05:40	06:20
07/06 158	40	05:40	06:20
08/06 159	40	05:40	06:20
09/06 160	40	05:40	06:20
10/06 161	40	05:40	06:20
11/06 162	40	05:40	06:20
12/06 163	40	05:40	06:20
13/06 164	40	05:40	06:20
14/06 165	40	05:40	06:20
15/06 166	40	05:40	06:20
16/06 167	40	05:40	06:20
17/06 168	40	05:40	06:20
18/06 169	40	05:40	06:20

19/06 170	40	05:40	06:20
20/06 171	40	05:40	06:20
21/06 172	40	05:40	06:20
22/06 173	40	05:40	06:20
23/06 174	40	05:40	06:20
24/06 175	40	05:40	06:20
25/06 176	40	05:40	06:20
26/06 177	40	05:40	06:20
27/06 178	40	05:40	06:20
28/06 179	40	05:40	06:20
29/06 180	40	05:40	06:20
30/06 181	40	05:40	06:20
01/07 182	40	05:40	06:20
02/07 183	40	05:40	06:20
03/07 184	40	05:40	06:20
04/07 185	40	05:40	06:20
05/07 186	40	05:40	06:20
06/07 187	40	05:40	06:20
07/07 188	40	05:40	06:20
08/07 189	40	05:40	06:20
09/07 190	40	05:40	06:20
10/07 191	40	05:40	06:20
11/07 192	50	05:40	06:30
12/07 193	50	05:40	06:30
13/07 194	50	05:40	06:30
14/07 195	50	05:40	06:30
15/07 196	50	05:40	06:30
16/07 197	50	05:40	06:30
17/07 198	50	05:40	06:30
18/07 199	50	05:40	06:30
19/07 200	50	05:40	06:30
20/07 201	50	05:40	06:30
21/07 202	50	05:40	06:30
22/07 203	50	05:40	06:30
23/07 204	50	05:40	06:30
24/07 205	50	05:40	06:30
25/07 206	50	05:40	06:30
26/07 207	50	05:40	06:30
27/07 208	50	05:40	06:30
28/07 209	50	05:40	06:30
29/07 210	50	05:40	06:30
30/07 211	40	05:50	06:30
31/07 212	40	05:50	06:30
01/08 213	30	05:50	06:20
02/08 214	30	05:50	06:20
03/08 215	30	05:50	06:20

04/08 216	30	05:50	06:20
05/08 217	30	05:50	06:20
06/08 218	30	05:50	06:20
07/08 219	30	05:50	06:20
08/08 220	30	05:50	06:20
09/08 221	10	06:00	06:10
10/08 222	10	06:00	06:10

Table 2 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:2

Height: 2m
Easting: 388338m
Northing: 4394355m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**44**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 122	40	05:40	06:20
24/04 114	10	06:00	06:10
25/04 115	10	06:00	06:10
26/04 116	30	05:50	06:20
27/04 117	30	05:50	06:20
28/04 118	30	05:50	06:20
29/04 119	30	05:50	06:20
30/04 120	30	05:50	06:20
01/05 121	30	05:50	06:20
02/05 122	40	05:40	06:20
03/05 123	40	05:40	06:20
04/05 124	40	05:40	06:20
05/05 125	40	05:40	06:20
06/05 126	40	05:40	06:20
07/05 127	40	05:40	06:20
08/05 128	40	05:40	06:20
09/05 129	40	05:40	06:20
10/05 130	40	05:40	06:20
11/05 131	40	05:40	06:20
12/05 132	40	05:40	06:20
13/05 133	40	05:40	06:20
14/05 134	40	05:40	06:20
15/05 135	40	05:40	06:20
16/05 136	40	05:40	06:20
17/05 137	40	05:40	06:20
18/05 138	40	05:40	06:20
19/05 139	40	05:40	06:20
20/05 140	40	05:40	06:20

21/05 141	40	05:40	06:20
22/05 142	30	05:50	06:20
23/05 143	30	05:50	06:20
24/05 144	30	05:50	06:20
25/05 145	30	05:50	06:20
26/05 146	30	05:50	06:20
27/05 147	30	05:50	06:20
28/05 148	30	05:50	06:20
29/05 149	30	05:50	06:20
30/05 150	20	05:50	06:10
31/05 151	20	05:50	06:10
01/06 152	10	06:00	06:10
02/06 153	10	06:00	06:10
03/06 154	10	06:00	06:10
04/06 155	10	06:00	06:10
05/06 156	10	06:00	06:10
08/07 189	10	06:10	06:20
09/07 190	20	06:00	06:20
10/07 191	20	06:00	06:20
11/07 192	20	06:00	06:20
12/07 193	20	06:00	06:20
13/07 194	20	06:00	06:20
14/07 195	30	06:00	06:30
15/07 196	30	06:00	06:30
16/07 197	30	06:00	06:30
17/07 198	30	06:00	06:30
18/07 199	30	06:00	06:30
19/07 200	30	06:00	06:30
20/07 201	30	06:00	06:30
21/07 202	30	06:00	06:30
22/07 203	30	06:00	06:30
23/07 204	30	06:00	06:30
24/07 205	40	05:50	06:30
25/07 206	40	05:50	06:30
26/07 207	40	05:50	06:30
27/07 208	40	05:50	06:30
28/07 209	40	05:50	06:30
29/07 210	40	05:50	06:30
30/07 211	40	05:50	06:30
31/07 212	40	05:50	06:30
01/08 213	40	05:50	06:30
02/08 214	40	05:50	06:30
03/08 215	40	05:50	06:30
04/08 216	40	05:50	06:30
05/08 217	40	05:50	06:30
06/08 218	40	05:50	06:30

07/08 219	40	05:50	06:30
08/08 220	40	05:50	06:30
09/08 221	40	05:50	06:30
10/08 222	40	05:50	06:30
11/08 223	40	05:50	06:30
12/08 224	30	06:00	06:30
13/08 225	30	06:00	06:30
14/08 226	30	06:00	06:30
15/08 227	30	06:00	06:30
16/08 228	20	06:00	06:20
17/08 229	20	06:00	06:20
18/08 230	20	06:00	06:20

Table 3 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:3

Height: 2m
Easting: 388353m
Northing: 4394374m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**43**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 116	40	05:50	06:30
19/04 109	10	06:10	06:20
20/04 110	20	06:00	06:20
21/04 111	20	06:00	06:20
22/04 112	30	06:00	06:30
23/04 113	30	06:00	06:30
24/04 114	30	06:00	06:30
25/04 115	30	06:00	06:30
26/04 116	40	05:50	06:30
27/04 117	40	05:50	06:30
28/04 118	40	05:50	06:30
29/04 119	40	05:50	06:30
30/04 120	40	05:50	06:30
01/05 121	40	05:50	06:30
02/05 122	40	05:50	06:30
03/05 123	40	05:50	06:30
04/05 124	40	05:50	06:30
05/05 125	40	05:50	06:30
06/05 126	40	05:50	06:30
07/05 127	40	05:50	06:30
08/05 128	40	05:50	06:30
09/05 129	40	05:50	06:30
10/05 130	40	05:50	06:30

11/05 131	40	05:50	06:30
12/05 132	40	05:50	06:30
13/05 133	40	05:50	06:30
14/05 134	40	05:50	06:30
15/05 135	40	05:50	06:30
16/05 136	40	05:50	06:30
17/05 137	40	05:50	06:30
18/05 138	40	05:50	06:30
19/05 139	40	05:50	06:30
20/05 140	30	06:00	06:30
21/05 141	20	06:00	06:20
22/05 142	20	06:00	06:20
23/05 143	20	06:00	06:20
24/05 144	20	06:00	06:20
25/05 145	20	06:00	06:20
26/05 146	20	06:00	06:20
27/05 147	20	06:00	06:20
16/07 197	20	06:10	06:30
17/07 198	20	06:10	06:30
18/07 199	20	06:10	06:30
19/07 200	20	06:10	06:30
20/07 201	20	06:10	06:30
21/07 202	20	06:10	06:30
22/07 203	20	06:10	06:30
23/07 204	30	06:00	06:30
24/07 205	40	06:00	06:40
25/07 206	40	06:00	06:40
26/07 207	40	06:00	06:40
27/07 208	40	06:00	06:40
28/07 209	40	06:00	06:40
29/07 210	40	06:00	06:40
30/07 211	40	06:00	06:40
31/07 212	40	06:00	06:40
01/08 213	40	06:00	06:40
02/08 214	40	06:00	06:40
03/08 215	40	06:00	06:40
04/08 216	40	06:00	06:40
05/08 217	40	06:00	06:40
06/08 218	40	06:00	06:40
07/08 219	40	06:00	06:40
08/08 220	40	06:00	06:40
09/08 221	40	06:00	06:40
10/08 222	40	06:00	06:40
11/08 223	40	06:00	06:40
12/08 224	40	06:00	06:40
13/08 225	40	06:00	06:40

14/08 226	40	06:00	06:40
15/08 227	40	06:00	06:40
16/08 228	40	06:00	06:40
17/08 229	40	06:00	06:40
18/08 230	30	06:00	06:30
19/08 231	30	06:00	06:30
20/08 232	30	06:00	06:30
21/08 233	30	06:00	06:30
22/08 234	20	06:10	06:30
23/08 235	10	06:10	06:20

Table 4 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:4

Height: 2m
Easting: 388337m
Northing: 4394393m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**35**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 108	40	06:00	06:40
13/04 103	20	06:10	06:30
14/04 104	20	06:10	06:30
15/04 105	20	06:10	06:30
16/04 106	20	06:10	06:30
17/04 107	30	06:00	06:30
18/04 108	40	06:00	06:40
19/04 109	40	06:00	06:40
20/04 110	40	06:00	06:40
21/04 111	40	06:00	06:40
22/04 112	40	06:00	06:40
23/04 113	40	06:00	06:40
24/04 114	40	06:00	06:40
25/04 115	40	06:00	06:40
26/04 116	40	06:00	06:40
27/04 117	40	06:00	06:40
28/04 118	40	06:00	06:40
29/04 119	40	06:00	06:40
30/04 120	40	06:00	06:40
01/05 121	40	06:00	06:40
02/05 122	40	06:00	06:40
03/05 123	40	06:00	06:40
04/05 124	30	06:00	06:30
05/05 125	30	06:00	06:30
06/05 126	30	06:00	06:30

07/05 127	30	06:00	06:30
08/05 128	30	06:00	06:30
09/05 129	30	06:00	06:30
10/05 130	30	06:00	06:30
11/05 131	30	06:00	06:30
12/05 132	30	06:00	06:30
13/05 133	20	06:10	06:30
14/05 134	10	06:10	06:20
15/05 135	10	06:10	06:20
29/07 210	10	06:20	06:30
30/07 211	10	06:20	06:30
31/07 212	30	06:10	06:40
01/08 213	30	06:10	06:40
02/08 214	30	06:10	06:40
03/08 215	30	06:10	06:40
04/08 216	30	06:10	06:40
05/08 217	30	06:10	06:40
06/08 218	30	06:10	06:40
07/08 219	30	06:10	06:40
08/08 220	30	06:10	06:40
09/08 221	30	06:10	06:40
10/08 222	30	06:10	06:40
11/08 223	40	06:00	06:40
12/08 224	40	06:00	06:40
13/08 225	40	06:00	06:40
14/08 226	40	06:00	06:40
15/08 227	40	06:00	06:40
16/08 228	40	06:00	06:40
17/08 229	40	06:00	06:40
18/08 230	40	06:00	06:40
19/08 231	40	06:00	06:40
20/08 232	40	06:00	06:40
21/08 233	40	06:00	06:40
22/08 234	40	06:00	06:40
23/08 235	40	06:00	06:40
24/08 236	40	06:00	06:40
25/08 237	30	06:10	06:40
26/08 238	30	06:10	06:40
27/08 239	20	06:10	06:30
28/08 240	20	06:10	06:30
29/08 241	20	06:10	06:30
30/08 242	10	06:20	06:30

Table 5 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:5

WES Engineering Inc.
706 S. Orchard St, Madison, WI 53715, Ph#608-259-9304 WWW.WESENGINEERING.COM

Height: 2m
Easting: 388336m
Northing: 4394394m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	34
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 107	40	06:00	06:40
13/04 103	20	06:10	06:30
14/04 104	20	06:10	06:30
15/04 105	20	06:10	06:30
16/04 106	20	06:10	06:30
17/04 107	40	06:00	06:40
18/04 108	40	06:00	06:40
19/04 109	40	06:00	06:40
20/04 110	40	06:00	06:40
21/04 111	40	06:00	06:40
22/04 112	40	06:00	06:40
23/04 113	40	06:00	06:40
24/04 114	40	06:00	06:40
25/04 115	40	06:00	06:40
26/04 116	40	06:00	06:40
27/04 117	40	06:00	06:40
28/04 118	40	06:00	06:40
29/04 119	40	06:00	06:40
30/04 120	40	06:00	06:40
01/05 121	40	06:00	06:40
02/05 122	40	06:00	06:40
03/05 123	40	06:00	06:40
04/05 124	30	06:00	06:30
05/05 125	30	06:00	06:30
06/05 126	30	06:00	06:30
07/05 127	30	06:00	06:30
08/05 128	30	06:00	06:30
09/05 129	30	06:00	06:30
10/05 130	30	06:00	06:30
11/05 131	30	06:00	06:30
12/05 132	20	06:10	06:30
13/05 133	10	06:10	06:20
14/05 134	10	06:10	06:20
29/07 210	10	06:20	06:30
30/07 211	10	06:20	06:30
31/07 212	20	06:20	06:40
01/08 213	30	06:10	06:40
02/08 214	30	06:10	06:40
03/08 215	30	06:10	06:40

04/08 216	30	06:10	06:40
05/08 217	30	06:10	06:40
06/08 218	30	06:10	06:40
07/08 219	30	06:10	06:40
08/08 220	30	06:10	06:40
09/08 221	30	06:10	06:40
10/08 222	30	06:10	06:40
11/08 223	30	06:10	06:40
12/08 224	40	06:00	06:40
13/08 225	40	06:00	06:40
14/08 226	40	06:00	06:40
15/08 227	40	06:00	06:40
16/08 228	40	06:00	06:40
17/08 229	40	06:00	06:40
18/08 230	40	06:00	06:40
19/08 231	40	06:00	06:40
20/08 232	40	06:00	06:40
21/08 233	40	06:00	06:40
22/08 234	40	06:00	06:40
23/08 235	40	06:00	06:40
24/08 236	40	06:00	06:40
25/08 237	30	06:10	06:40
26/08 238	30	06:10	06:40
27/08 239	30	06:10	06:40
28/08 240	20	06:10	06:30
29/08 241	20	06:10	06:30
30/08 242	20	06:10	06:30

Table 6 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:6

Height: 2m
Easting: 388328m
Northing: 4394417m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**31**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 101	40	06:10	06:50
06/04 96	20	06:20	06:40
07/04 97	20	06:20	06:40
08/04 98	20	06:20	06:40
09/04 99	30	06:10	06:40
10/04 100	30	06:10	06:40
11/04 101	40	06:10	06:50
12/04 102	40	06:10	06:50

13/04 103	40	06:10	06:50
14/04 104	40	06:10	06:50
15/04 105	40	06:10	06:50
16/04 106	40	06:10	06:50
17/04 107	40	06:10	06:50
18/04 108	40	06:10	06:50
19/04 109	40	06:10	06:50
20/04 110	40	06:10	06:50
21/04 111	40	06:10	06:50
22/04 112	40	06:10	06:50
23/04 113	30	06:10	06:40
24/04 114	30	06:10	06:40
25/04 115	30	06:10	06:40
26/04 116	30	06:10	06:40
27/04 117	30	06:10	06:40
28/04 118	30	06:10	06:40
29/04 119	30	06:10	06:40
30/04 120	30	06:10	06:40
01/05 121	30	06:10	06:40
02/05 122	20	06:10	06:30
03/05 123	10	06:20	06:30
04/05 124	10	06:20	06:30
08/08 220	10	06:30	06:40
09/08 221	10	06:30	06:40
10/08 222	20	06:20	06:40
11/08 223	20	06:20	06:40
12/08 224	30	06:20	06:50
13/08 225	30	06:20	06:50
14/08 226	30	06:20	06:50
15/08 227	40	06:10	06:50
16/08 228	40	06:10	06:50
17/08 229	40	06:10	06:50
18/08 230	40	06:10	06:50
19/08 231	40	06:10	06:50
20/08 232	40	06:10	06:50
21/08 233	40	06:10	06:50
22/08 234	40	06:10	06:50
23/08 235	40	06:10	06:50
24/08 236	40	06:10	06:50
25/08 237	40	06:10	06:50
26/08 238	40	06:10	06:50
27/08 239	40	06:10	06:50
28/08 240	40	06:10	06:50
29/08 241	40	06:10	06:50
30/08 242	40	06:10	06:50
31/08 243	30	06:10	06:40

01/09 244	30	06:10	06:40
02/09 245	30	06:10	06:40
03/09 246	30	06:10	06:40
04/09 247	30	06:10	06:40
05/09 248	10	06:20	06:30
06/09 249	10	06:20	06:30

Table 7 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:7

Height: 2m
Easting: 388308m
Northing: 4394441m
Bearing: 180deg
Tilt: 0deg

Table 8 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:8

Height: 2m
Easting: 388275m
Northing: 4394438m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	24
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 98	40	06:10	06:50
30/03 89	10	06:30	06:40
31/03 90	10	06:30	06:40
01/04 91	30	06:20	06:50
02/04 92	30	06:20	06:50
03/04 93	30	06:20	06:50
04/04 94	30	06:20	06:50
05/04 95	30	06:20	06:50
06/04 96	30	06:20	06:50
07/04 97	30	06:20	06:50
08/04 98	40	06:10	06:50
09/04 99	40	06:10	06:50
10/04 100	40	06:10	06:50
11/04 101	40	06:10	06:50
12/04 102	40	06:10	06:50
13/04 103	40	06:10	06:50
14/04 104	40	06:10	06:50
15/04 105	40	06:10	06:50
16/04 106	40	06:10	06:50
17/04 107	30	06:10	06:40

18/04 108	20	06:20	06:40
19/04 109	20	06:20	06:40
20/04 110	20	06:20	06:40
21/04 111	20	06:20	06:40
22/04 112	10	06:20	06:30
20/08 232	10	06:30	06:40
21/08 233	10	06:30	06:40
22/08 234	20	06:20	06:40
23/08 235	20	06:20	06:40
24/08 236	30	06:20	06:50
25/08 237	30	06:20	06:50
26/08 238	30	06:20	06:50
27/08 239	30	06:20	06:50
28/08 240	40	06:10	06:50
29/08 241	40	06:10	06:50
30/08 242	40	06:10	06:50
31/08 243	40	06:10	06:50
01/09 244	40	06:10	06:50
02/09 245	40	06:10	06:50
03/09 246	40	06:10	06:50
04/09 247	40	06:10	06:50
05/09 248	40	06:10	06:50
06/09 249	40	06:10	06:50
07/09 250	30	06:10	06:40
08/09 251	30	06:10	06:40
09/09 252	30	06:10	06:40
10/09 253	30	06:10	06:40
11/09 254	20	06:20	06:40
12/09 255	10	06:20	06:30
13/09 256	10	06:20	06:30

Table 9 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:9

Height: 2m
Easting: 388242m
Northing: 4394437m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**20**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 95	40	06:10	06:50
30/03 89	10	06:30	06:40
31/03 90	20	06:20	06:40
01/04 91	20	06:20	06:40
02/04 92	20	06:20	06:40

03/04 93	30	06:20	06:50
04/04 94	30	06:20	06:50
05/04 95	40	06:10	06:50
06/04 96	40	06:10	06:50
07/04 97	40	06:10	06:50
08/04 98	40	06:10	06:50
09/04 99	40	06:10	06:50
10/04 100	40	06:10	06:50
11/04 101	40	06:10	06:50
12/04 102	30	06:10	06:40
13/04 103	30	06:10	06:40
14/04 104	30	06:10	06:40
15/04 105	30	06:10	06:40
16/04 106	30	06:10	06:40
17/04 107	30	06:10	06:40
18/04 108	20	06:20	06:40
19/04 109	20	06:20	06:40
20/04 110	10	06:20	06:30
22/08 234	10	06:30	06:40
23/08 235	20	06:20	06:40
24/08 236	20	06:20	06:40
25/08 237	20	06:20	06:40
26/08 238	20	06:20	06:40
27/08 239	20	06:20	06:40
28/08 240	30	06:10	06:40
29/08 241	30	06:10	06:40
30/08 242	30	06:10	06:40
31/08 243	30	06:10	06:40
01/09 244	30	06:10	06:40
02/09 245	30	06:10	06:40
03/09 246	30	06:10	06:40
04/09 247	30	06:10	06:40
05/09 248	30	06:10	06:40
06/09 249	30	06:10	06:40
07/09 250	30	06:10	06:40
08/09 251	30	06:10	06:40
09/09 252	30	06:10	06:40
10/09 253	30	06:10	06:40
11/09 254	30	06:10	06:40
12/09 255	10	06:20	06:30
13/09 256	10	06:20	06:30

Table 10 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:10

Height: 2m

WES Engineering Inc.

706 S. Orchard St, Madison, WI 53715, Ph#608-259-9304 WWW.WESENGINEERING.COM

Easting: 388204m
Northing: 4394436m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	17
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 93	30	06:10	06:40
30/03 89	20	06:20	06:40
31/03 90	20	06:20	06:40
01/04 91	20	06:20	06:40
02/04 92	20	06:20	06:40
03/04 93	30	06:10	06:40
04/04 94	30	06:10	06:40
05/04 95	30	06:10	06:40
06/04 96	30	06:10	06:40
07/04 97	30	06:10	06:40
08/04 98	30	06:10	06:40
09/04 99	30	06:10	06:40
10/04 100	30	06:10	06:40
11/04 101	30	06:10	06:40
12/04 102	30	06:10	06:40
13/04 103	30	06:10	06:40
14/04 104	30	06:10	06:40
15/04 105	30	06:10	06:40
16/04 106	30	06:10	06:40
17/04 107	10	06:20	06:30
18/04 108	10	06:20	06:30
24/08 236	10	06:20	06:30
25/08 237	10	06:20	06:30
26/08 238	20	06:20	06:40
27/08 239	20	06:20	06:40
28/08 240	30	06:10	06:40
29/08 241	30	06:10	06:40
30/08 242	30	06:10	06:40
31/08 243	30	06:10	06:40
01/09 244	30	06:10	06:40
02/09 245	30	06:10	06:40
03/09 246	30	06:10	06:40
04/09 247	30	06:10	06:40
05/09 248	30	06:10	06:40
06/09 249	30	06:10	06:40
07/09 250	30	06:10	06:40
08/09 251	30	06:10	06:40
09/09 252	30	06:10	06:40
10/09 253	30	06:10	06:40
11/09 254	20	06:10	06:30

12/09 255	20	06:10	06:30
13/09 256	20	06:10	06:30

Table 11 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:11

Height: 2m
Easting: 388342m
Northing: 4394283m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**39**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 147	40	05:20	06:00
19/05 139	10	05:30	05:40
20/05 140	20	05:30	05:50
21/05 141	20	05:30	05:50
22/05 142	20	05:30	05:50
23/05 143	20	05:30	05:50
24/05 144	20	05:30	05:50
25/05 145	30	05:20	05:50
26/05 146	30	05:20	05:50
27/05 147	40	05:20	06:00
28/05 148	40	05:20	06:00
29/05 149	40	05:20	06:00
30/05 150	40	05:20	06:00
31/05 151	40	05:20	06:00
01/06 152	40	05:20	06:00
02/06 153	40	05:20	06:00
03/06 154	40	05:20	06:00
04/06 155	40	05:20	06:00
05/06 156	40	05:20	06:00
06/06 157	40	05:20	06:00
07/06 158	40	05:20	06:00
08/06 159	40	05:20	06:00
09/06 160	40	05:20	06:00
10/06 161	40	05:20	06:00
11/06 162	40	05:20	06:00
12/06 163	40	05:20	06:00
13/06 164	40	05:20	06:00
14/06 165	40	05:20	06:00
15/06 166	40	05:20	06:00
16/06 167	40	05:20	06:00
17/06 168	40	05:20	06:00
18/06 169	40	05:20	06:00
19/06 170	40	05:20	06:00

20/06 171	40	05:20	06:00
21/06 172	40	05:20	06:00
22/06 173	40	05:20	06:00
23/06 174	40	05:20	06:00
24/06 175	40	05:20	06:00
25/06 176	40	05:20	06:00
26/06 177	40	05:20	06:00
27/06 178	40	05:20	06:00
28/06 179	30	05:30	06:00
29/06 180	30	05:30	06:00
30/06 181	40	05:30	06:10
01/07 182	40	05:30	06:10
02/07 183	40	05:30	06:10
03/07 184	40	05:30	06:10
04/07 185	40	05:30	06:10
05/07 186	40	05:30	06:10
06/07 187	40	05:30	06:10
07/07 188	40	05:30	06:10
08/07 189	40	05:30	06:10
09/07 190	40	05:30	06:10
10/07 191	40	05:30	06:10
11/07 192	40	05:30	06:10
12/07 193	30	05:30	06:00
13/07 194	30	05:30	06:00
14/07 195	30	05:30	06:00
15/07 196	30	05:30	06:00
16/07 197	30	05:30	06:00
17/07 198	30	05:30	06:00
18/07 199	30	05:30	06:00
19/07 200	30	05:30	06:00
20/07 201	30	05:30	06:00
21/07 202	20	05:40	06:00
22/07 203	20	05:40	06:00
23/07 204	20	05:40	06:00
24/07 205	20	05:40	06:00

Table 12 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:12

Height: 2m
Easting: 388346m
Northing: 4394254m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**13**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 168	30	05:20	05:50
05/06 156	20	05:20	05:40

06/06 157	20	05:20	05:40
07/06 158	20	05:20	05:40
08/06 159	20	05:20	05:40
09/06 160	20	05:20	05:40
10/06 161	20	05:20	05:40
11/06 162	20	05:20	05:40
12/06 163	20	05:20	05:40
13/06 164	20	05:20	05:40
14/06 165	20	05:20	05:40
15/06 166	20	05:20	05:40
16/06 167	20	05:20	05:40
17/06 168	30	05:20	05:50
18/06 169	30	05:20	05:50
19/06 170	30	05:20	05:50
20/06 171	30	05:20	05:50
21/06 172	30	05:20	05:50
22/06 173	30	05:20	05:50
23/06 174	30	05:20	05:50
24/06 175	30	05:20	05:50
25/06 176	30	05:20	05:50
26/06 177	30	05:20	05:50
27/06 178	30	05:20	05:50
28/06 179	30	05:20	05:50
29/06 180	30	05:20	05:50
30/06 181	30	05:20	05:50
01/07 182	30	05:20	05:50
02/07 183	30	05:20	05:50
03/07 184	20	05:30	05:50
04/07 185	20	05:30	05:50
05/07 186	10	05:30	05:40
06/07 187	10	05:30	05:40
07/07 188	10	05:30	05:40
08/07 189	10	05:30	05:40
09/07 190	10	05:30	05:40

Table 13 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:13

Height: 2m
Easting: 388195m
Northing: 4394359m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**19**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 228	40	05:50	06:30

14/04 104	10	06:00	06:10
15/04 105	10	06:00	06:10
16/04 106	20	06:00	06:20
17/04 107	30	05:50	06:20
18/04 108	30	05:50	06:20
19/04 109	30	05:50	06:20
20/04 110	30	05:50	06:20
21/04 111	30	05:50	06:20
22/04 112	30	05:50	06:20
23/04 113	30	05:50	06:20
24/04 114	30	05:50	06:20
25/04 115	30	05:50	06:20
26/04 116	30	05:50	06:20
27/04 117	30	05:50	06:20
28/04 118	30	05:50	06:20
29/04 119	30	05:50	06:20
30/04 120	30	05:50	06:20
01/05 121	20	05:50	06:10
02/05 122	20	05:50	06:10
03/05 123	20	05:50	06:10
04/05 124	20	05:50	06:10
05/05 125	20	05:50	06:10
06/05 126	10	06:00	06:10
06/08 218	10	06:10	06:20
07/08 219	20	06:00	06:20
08/08 220	20	06:00	06:20
09/08 221	20	06:00	06:20
10/08 222	20	06:00	06:20
11/08 223	20	06:00	06:20
12/08 224	20	06:00	06:20
13/08 225	20	06:00	06:20
14/08 226	30	06:00	06:30
15/08 227	30	06:00	06:30
16/08 228	40	05:50	06:30
17/08 229	40	05:50	06:30
18/08 230	40	05:50	06:30
19/08 231	40	05:50	06:30
20/08 232	30	05:50	06:20
21/08 233	30	05:50	06:20
22/08 234	30	05:50	06:20
23/08 235	30	05:50	06:20
24/08 236	20	06:00	06:20
25/08 237	20	06:00	06:20
26/08 238	20	06:00	06:20
27/08 239	20	06:00	06:20
28/08 240	10	06:00	06:10

29/08 241	10	06:00	06:10

Table 14 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:14

Height: 2m
Easting: 388208m
Northing: 4394321m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**22**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 219	40	05:40	06:20
23/04 113	10	05:50	06:00
24/04 114	20	05:40	06:00
25/04 115	20	05:40	06:00
26/04 116	20	05:40	06:00
27/04 117	30	05:40	06:10
28/04 118	30	05:40	06:10
29/04 119	30	05:40	06:10
30/04 120	30	05:40	06:10
01/05 121	30	05:40	06:10
02/05 122	30	05:40	06:10
03/05 123	30	05:40	06:10
04/05 124	30	05:40	06:10
05/05 125	30	05:40	06:10
06/05 126	30	05:40	06:10
07/05 127	30	05:40	06:10
08/05 128	30	05:40	06:10
09/05 129	30	05:40	06:10
10/05 130	30	05:40	06:10
11/05 131	30	05:40	06:10
12/05 132	20	05:40	06:00
13/05 133	20	05:40	06:00
14/05 134	20	05:40	06:00
15/05 135	20	05:40	06:00
16/05 136	20	05:40	06:00
17/05 137	20	05:40	06:00
18/05 138	20	05:40	06:00
19/05 139	10	05:50	06:00
24/07 205	10	06:00	06:10
25/07 206	10	06:00	06:10
26/07 207	20	05:50	06:10
27/07 208	20	05:50	06:10
28/07 209	20	05:50	06:10
29/07 210	20	05:50	06:10

30/07 211	20	05:50	06:10
31/07 212	20	05:50	06:10
01/08 213	30	05:50	06:20
02/08 214	30	05:50	06:20
03/08 215	30	05:50	06:20
04/08 216	30	05:50	06:20
05/08 217	30	05:50	06:20
06/08 218	30	05:50	06:20
07/08 219	40	05:40	06:20
08/08 220	40	05:40	06:20
09/08 221	40	05:40	06:20
10/08 222	40	05:40	06:20
11/08 223	40	05:40	06:20
12/08 224	30	05:50	06:20
13/08 225	20	05:50	06:10
14/08 226	20	05:50	06:10
15/08 227	20	05:50	06:10
16/08 228	20	05:50	06:10
17/08 229	20	05:50	06:10
18/08 230	20	05:50	06:10
19/08 231	20	05:50	06:10

Table 15 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:15

Height: 2m
Easting: 388173m
Northing: 4394319m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**18**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 116	30	05:40	06:10
21/04 111	10	05:50	06:00
22/04 112	10	05:50	06:00
23/04 113	20	05:40	06:00
24/04 114	20	05:40	06:00
25/04 115	20	05:40	06:00
26/04 116	30	05:40	06:10
27/04 117	30	05:40	06:10
28/04 118	30	05:40	06:10
29/04 119	30	05:40	06:10
30/04 120	30	05:40	06:10
01/05 121	30	05:40	06:10
02/05 122	30	05:40	06:10
03/05 123	30	05:40	06:10

04/05 124	30	05:40	06:10
05/05 125	30	05:40	06:10
06/05 126	30	05:40	06:10
07/05 127	20	05:40	06:00
08/05 128	20	05:40	06:00
09/05 129	20	05:40	06:00
10/05 130	20	05:40	06:00
11/05 131	20	05:40	06:00
12/05 132	20	05:40	06:00
13/05 133	20	05:40	06:00
14/05 134	20	05:40	06:00
15/05 135	10	05:50	06:00
29/07 210	10	06:00	06:10
30/07 211	20	05:50	06:10
31/07 212	20	05:50	06:10
01/08 213	20	05:50	06:10
02/08 214	20	05:50	06:10
03/08 215	20	05:50	06:10
04/08 216	20	05:50	06:10
05/08 217	20	05:50	06:10
06/08 218	20	05:50	06:10
07/08 219	20	05:50	06:10
08/08 220	30	05:50	06:20
09/08 221	30	05:50	06:20
10/08 222	30	05:50	06:20
11/08 223	30	05:40	06:10
12/08 224	30	05:40	06:10
13/08 225	30	05:40	06:10
14/08 226	20	05:50	06:10
15/08 227	20	05:50	06:10
16/08 228	20	05:50	06:10
17/08 229	20	05:50	06:10
18/08 230	20	05:50	06:10
19/08 231	20	05:50	06:10
20/08 232	20	05:50	06:10
21/08 233	10	05:50	06:00

Table 16 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:16

Height: 2m
Easting: 388293m
Northing: 4394188m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	0

Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 1	0	00:00	00:00

Table 17 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:17

Height: 2m
Easting: 388237m
Northing: 4394161m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	0
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 1	0	00:00	00:00

Table 18 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:18

Height: 2m
Easting: 388089m
Northing: 4394180m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	28
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 147	30	05:10	05:40
14/05 134	10	05:20	05:30
15/05 135	10	05:20	05:30
16/05 136	20	05:10	05:30
17/05 137	20	05:10	05:30
18/05 138	20	05:10	05:30
19/05 139	20	05:10	05:30
20/05 140	20	05:10	05:30
21/05 141	20	05:10	05:30
22/05 142	20	05:10	05:30
23/05 143	20	05:10	05:30
24/05 144	20	05:10	05:30
25/05 145	20	05:10	05:30
26/05 146	20	05:10	05:30
27/05 147	30	05:10	05:40
28/05 148	30	05:10	05:40
29/05 149	30	05:10	05:40
30/05 150	30	05:10	05:40
31/05 151	30	05:10	05:40
01/06 152	30	05:10	05:40
02/06 153	30	05:10	05:40

03/06 154	30	05:10	05:40
04/06 155	30	05:10	05:40
05/06 156	30	05:10	05:40
06/06 157	30	05:10	05:40
07/06 158	30	05:10	05:40
08/06 159	30	05:10	05:40
09/06 160	30	05:10	05:40
10/06 161	30	05:10	05:40
11/06 162	30	05:10	05:40
12/06 163	30	05:10	05:40
13/06 164	30	05:10	05:40
14/06 165	30	05:10	05:40
15/06 166	30	05:10	05:40
16/06 167	30	05:10	05:40
17/06 168	20	05:20	05:40
18/06 169	20	05:20	05:40
19/06 170	20	05:20	05:40
20/06 171	20	05:20	05:40
21/06 172	20	05:20	05:40
22/06 173	20	05:20	05:40
23/06 174	20	05:20	05:40
24/06 175	20	05:20	05:40
25/06 176	20	05:20	05:40
26/06 177	20	05:20	05:40
27/06 178	20	05:20	05:40
28/06 179	20	05:20	05:40
29/06 180	20	05:20	05:40
30/06 181	20	05:20	05:40
01/07 182	20	05:20	05:40
02/07 183	20	05:20	05:40
03/07 184	20	05:20	05:40
04/07 185	20	05:20	05:40
05/07 186	20	05:20	05:40
06/07 187	20	05:20	05:40
07/07 188	20	05:20	05:40
08/07 189	20	05:20	05:40
09/07 190	20	05:20	05:40
10/07 191	20	05:20	05:40
11/07 192	20	05:20	05:40
12/07 193	20	05:20	05:40
13/07 194	20	05:20	05:40
14/07 195	20	05:20	05:40
15/07 196	20	05:20	05:40
16/07 197	20	05:20	05:40
17/07 198	20	05:20	05:40
18/07 199	20	05:20	05:40

19/07 200	20	05:20	05:40
20/07 201	20	05:20	05:40
21/07 202	20	05:20	05:40
22/07 203	20	05:20	05:40
23/07 204	20	05:20	05:40
24/07 205	20	05:20	05:40
25/07 206	20	05:20	05:40
26/07 207	20	05:20	05:40
27/07 208	20	05:20	05:40
28/07 209	10	05:30	05:40
29/07 210	10	05:30	05:40

Table 19 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:19

Height: 2m
Easting: 388072m
Northing: 4394143m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**23**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 148	30	05:00	05:30
21/05 141	10	05:10	05:20
22/05 142	10	05:10	05:20
23/05 143	10	05:10	05:20
24/05 144	10	05:10	05:20
25/05 145	10	05:10	05:20
26/05 146	20	05:10	05:30
27/05 147	20	05:10	05:30
28/05 148	30	05:00	05:30
29/05 149	30	05:00	05:30
30/05 150	30	05:00	05:30
31/05 151	30	05:00	05:30
01/06 152	30	05:00	05:30
02/06 153	30	05:00	05:30
03/06 154	30	05:00	05:30
04/06 155	30	05:00	05:30
05/06 156	30	05:00	05:30
06/06 157	30	05:00	05:30
07/06 158	30	05:00	05:30
08/06 159	30	05:00	05:30
09/06 160	30	05:00	05:30
10/06 161	30	05:00	05:30
11/06 162	30	05:00	05:30
12/06 163	20	05:10	05:30

13/06 164	20	05:10	05:30
14/06 165	20	05:10	05:30
15/06 166	20	05:10	05:30
16/06 167	20	05:10	05:30
17/06 168	20	05:10	05:30
18/06 169	20	05:10	05:30
19/06 170	20	05:10	05:30
20/06 171	20	05:10	05:30
21/06 172	20	05:10	05:30
22/06 173	20	05:10	05:30
23/06 174	20	05:10	05:30
24/06 175	20	05:10	05:30
25/06 176	20	05:10	05:30
26/06 177	20	05:10	05:30
27/06 178	20	05:10	05:30
28/06 179	20	05:10	05:30
29/06 180	20	05:10	05:30
30/06 181	20	05:10	05:30
01/07 182	20	05:10	05:30
02/07 183	20	05:10	05:30
03/07 184	20	05:10	05:30
04/07 185	30	05:10	05:40
05/07 186	30	05:10	05:40
06/07 187	30	05:10	05:40
07/07 188	30	05:10	05:40
08/07 189	30	05:10	05:40
09/07 190	30	05:10	05:40
10/07 191	30	05:10	05:40
11/07 192	30	05:10	05:40
12/07 193	30	05:10	05:40
13/07 194	30	05:10	05:40
14/07 195	30	05:10	05:40
15/07 196	20	05:10	05:30
16/07 197	20	05:10	05:30
17/07 198	20	05:10	05:30
18/07 199	10	05:20	05:30
19/07 200	10	05:20	05:30
20/07 201	10	05:20	05:30
21/07 202	10	05:20	05:30
22/07 203	10	05:20	05:30

Table 20 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:20

Height: 2m
Easting: 388045m
Northing: 4394419m

Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	11
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 245	30	06:00	06:30
30/03 89	10	06:20	06:30
31/03 90	20	06:10	06:30
01/04 91	20	06:10	06:30
02/04 92	20	06:10	06:30
03/04 93	20	06:10	06:30
04/04 94	20	06:10	06:30
05/04 95	20	06:10	06:30
06/04 96	20	06:10	06:30
07/04 97	20	06:10	06:30
08/04 98	20	06:10	06:30
09/04 99	20	06:10	06:30
10/04 100	20	06:10	06:30
11/04 101	20	06:10	06:30
12/04 102	20	06:10	06:30
13/04 103	10	06:10	06:20
14/04 104	10	06:10	06:20
28/08 240	10	06:10	06:20
29/08 241	10	06:10	06:20
30/08 242	20	06:10	06:30
31/08 243	20	06:10	06:30
01/09 244	20	06:10	06:30
02/09 245	30	06:00	06:30
03/09 246	30	06:00	06:30
04/09 247	30	06:00	06:30
05/09 248	30	06:00	06:30
06/09 249	30	06:00	06:30
07/09 250	30	06:00	06:30
08/09 251	30	06:00	06:30
09/09 252	30	06:00	06:30
10/09 253	20	06:00	06:20
11/09 254	20	06:00	06:20
12/09 255	10	06:10	06:20
13/09 256	10	06:10	06:20

Table 21 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:21

Height: 2m
Easting: 388046m
Northing: 4394476m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	9
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 254	30	06:10	06:40
21/03 80	10	06:30	06:40
22/03 81	10	06:30	06:40
23/03 82	10	06:30	06:40
24/03 83	20	06:20	06:40
25/03 84	20	06:20	06:40
26/03 85	20	06:20	06:40
27/03 86	20	06:20	06:40
28/03 87	20	06:20	06:40
29/03 88	20	06:20	06:40
30/03 89	20	06:20	06:40
31/03 90	20	06:20	06:40
01/04 91	20	06:20	06:40
02/04 92	20	06:20	06:40
03/04 93	20	06:20	06:40
04/04 94	20	06:20	06:40
07/09 250	10	06:20	06:30
08/09 251	10	06:20	06:30
09/09 252	10	06:20	06:30
10/09 253	20	06:10	06:30
11/09 254	30	06:10	06:40
12/09 255	30	06:10	06:40
13/09 256	30	06:10	06:40
14/09 257	30	06:10	06:40
15/09 258	20	06:10	06:30
16/09 259	20	06:10	06:30
17/09 260	20	06:10	06:30
18/09 261	20	06:10	06:30
19/09 262	20	06:10	06:30
20/09 263	20	06:10	06:30
21/09 264	20	06:10	06:30
22/09 265	10	06:20	06:30

Table 22 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:22

Height: 2m
Easting: 388047m
Northing: 4394533m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	10
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm

Worst Day !: 78	30	06:30	07:00
12/03 71	10	06:40	06:50
13/03 72	20	06:40	07:00
14/03 73	20	06:40	07:00
15/03 74	20	06:40	07:00
16/03 75	20	06:40	07:00
17/03 76	20	06:40	07:00
18/03 77	20	06:40	07:00
19/03 78	30	06:30	07:00
20/03 79	30	06:30	07:00
21/03 80	30	06:30	07:00
22/03 81	30	06:30	07:00
23/03 82	30	06:30	07:00
24/03 83	20	06:40	07:00
25/03 84	10	06:40	06:50
26/03 85	10	06:40	06:50
27/03 86	10	06:40	06:50
16/09 259	10	06:30	06:40
17/09 260	10	06:30	06:40
18/09 261	10	06:30	06:40
19/09 262	20	06:20	06:40
20/09 263	20	06:20	06:40
21/09 264	20	06:20	06:40
22/09 265	20	06:20	06:40
23/09 266	20	06:20	06:40
24/09 267	20	06:20	06:40
25/09 268	20	06:20	06:40
26/09 269	20	06:20	06:40
27/09 270	20	06:20	06:40
28/09 271	20	06:20	06:40
29/09 272	20	06:20	06:40
30/09 273	20	06:20	06:40

Table 23 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:23

Height: 2m
Easting: 388064m
Northing: 4394579m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	Libman	Hours per year	9
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 65	20	06:50	07:10
05/03 64	10	07:00	07:10
06/03 65	20	06:50	07:10

07/03 66	20	06:50	07:10
08/03 67	20	06:50	07:10
09/03 68	20	06:50	07:10
10/03 69	20	06:50	07:10
11/03 70	20	06:50	07:10
12/03 71	20	06:50	07:10
13/03 72	20	06:50	07:10
14/03 73	20	06:50	07:10
15/03 74	20	06:50	07:10
16/03 75	20	06:50	07:10
17/03 76	20	06:50	07:10
18/03 77	20	06:50	07:10
19/03 78	10	06:50	07:00
24/09 267	20	06:30	06:50
25/09 268	20	06:30	06:50
26/09 269	20	06:30	06:50
27/09 270	20	06:30	06:50
28/09 271	20	06:30	06:50
29/09 272	20	06:30	06:50
30/09 273	20	06:30	06:50
01/10 274	20	06:30	06:50
02/10 275	20	06:30	06:50
03/10 276	20	06:30	06:50
04/10 277	20	06:30	06:50
05/10 278	20	06:30	06:50
06/10 279	20	06:30	06:50
07/10 280	20	06:30	06:50
08/10 281	10	06:30	06:40

Table 24 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:24

Height: 2m
Easting: 388070m
Northing: 4394643m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**11**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 57	30	07:00	07:30
22/02 53	10	07:10	07:20
23/02 54	10	07:10	07:20
24/02 55	10	07:10	07:20
25/02 56	20	07:10	07:30
26/02 57	30	07:00	07:30
27/02 58	30	07:00	07:30

28/02 59	30	07:00	07:30
01/03 60	30	07:00	07:30
02/03 61	30	07:00	07:30
03/03 62	30	07:00	07:30
04/03 63	30	07:00	07:30
05/03 64	30	07:00	07:30
06/03 65	30	07:00	07:30
07/03 66	20	07:00	07:20
08/03 67	10	07:10	07:20
09/03 68	10	07:10	07:20
04/10 277	10	06:50	07:00
05/10 278	20	06:40	07:00
06/10 279	20	06:40	07:00
07/10 280	20	06:40	07:00
08/10 281	20	06:40	07:00
09/10 282	20	06:40	07:00
10/10 283	20	06:40	07:00
11/10 284	20	06:40	07:00
12/10 285	20	06:40	07:00
13/10 286	20	06:40	07:00
14/10 287	20	06:40	07:00
15/10 288	20	06:40	07:00
16/10 289	20	06:40	07:00
17/10 290	20	06:40	07:00
18/10 291	20	06:40	07:00
19/10 292	10	06:40	06:50

Table 25 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:25

Height: 2m
Easting: 388080m
Northing: 4394674m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**10**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 55	30	07:10	07:40
17/02 48	10	07:20	07:30
18/02 49	10	07:20	07:30
19/02 50	20	07:10	07:30
20/02 51	20	07:10	07:30
21/02 52	20	07:10	07:30
22/02 53	20	07:10	07:30
23/02 54	20	07:10	07:30
24/02 55	30	07:10	07:40

25/02 56	20	07:10	07:30
26/02 57	20	07:10	07:30
27/02 58	20	07:10	07:30
28/02 59	20	07:10	07:30
01/03 60	20	07:10	07:30
02/03 61	20	07:10	07:30
03/03 62	20	07:10	07:30
04/03 63	10	07:20	07:30
09/10 282	10	06:50	07:00
10/10 283	10	06:50	07:00
11/10 284	20	06:50	07:10
12/10 285	20	06:50	07:10
13/10 286	30	06:40	07:10
14/10 287	30	06:40	07:10
15/10 288	30	06:40	07:10
16/10 289	30	06:40	07:10
17/10 290	30	06:40	07:10
18/10 291	30	06:40	07:10
19/10 292	30	06:40	07:10
20/10 293	30	06:40	07:10
21/10 294	20	06:40	07:00
22/10 295	10	06:50	07:00
23/10 296	10	06:50	07:00
24/10 297	10	06:50	07:00

Table 26 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:26

Height: 2m
Easting: 388074m
Northing: 4394722m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**9**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 43	20	07:20	07:40
10/02 41	10	07:30	07:40
11/02 42	10	07:30	07:40
12/02 43	20	07:20	07:40
13/02 44	20	07:20	07:40
14/02 45	20	07:20	07:40
15/02 46	20	07:20	07:40
16/02 47	20	07:20	07:40
17/02 48	20	07:20	07:40
18/02 49	20	07:20	07:40
19/02 50	20	07:20	07:40

20/02 51	20	07:20	07:40
21/02 52	20	07:20	07:40
22/02 53	20	07:20	07:40
23/02 54	20	07:20	07:40
24/02 55	20	07:20	07:40
25/02 56	10	07:30	07:40
16/10 289	10	07:00	07:10
17/10 290	10	07:00	07:10
18/10 291	10	07:00	07:10
19/10 292	20	06:50	07:10
20/10 293	20	06:50	07:10
21/10 294	20	06:50	07:10
22/10 295	20	06:50	07:10
23/10 296	20	06:50	07:10
24/10 297	20	06:50	07:10
25/10 298	20	06:50	07:10
26/10 299	20	06:50	07:10
27/10 300	20	06:50	07:10
28/10 301	20	06:50	07:10
29/10 302	20	06:50	07:10
30/10 303	20	06:50	07:10
31/10 304	10	07:00	07:10

Table 27 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:27

Height: 2m
Easting: 388400m
Northing: 4394848m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**6**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 352	20	08:40	09:00
01/01 1	10	08:50	09:00
02/01 2	10	08:50	09:00
03/01 3	10	08:50	09:00
09/12 343	10	08:40	08:50
10/12 344	10	08:40	08:50
11/12 345	10	08:40	08:50
12/12 346	10	08:40	08:50
13/12 347	10	08:40	08:50
14/12 348	10	08:40	08:50
15/12 349	10	08:40	08:50
16/12 350	10	08:40	08:50
17/12 351	10	08:40	08:50

18/12 352	20	08:40	09:00
19/12 353	20	08:40	09:00
20/12 354	20	08:40	09:00
21/12 355	20	08:40	09:00
22/12 356	20	08:40	09:00
23/12 357	20	08:40	09:00
24/12 358	20	08:40	09:00
25/12 359	20	08:40	09:00
26/12 360	20	08:40	09:00
27/12 361	20	08:40	09:00
28/12 362	20	08:40	09:00
29/12 363	20	08:40	09:00
30/12 364	20	08:40	09:00
31/12 365	10	08:50	09:00

Table 28 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Receptor ID:28

Height: 2m
Easting: 389025m
Northing: 4394672m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	**Libman**	**Hours per year**	**67**
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 21	50	15:10	16:00
01/01 1	10	15:20	15:30
02/01 2	30	15:10	15:40
03/01 3	30	15:10	15:40
04/01 4	30	15:10	15:40
05/01 5	30	15:10	15:40
06/01 6	30	15:10	15:40
07/01 7	30	15:10	15:40
08/01 8	30	15:10	15:40
09/01 9	40	15:10	15:50
10/01 10	40	15:10	15:50
11/01 11	40	15:10	15:50
12/01 12	40	15:10	15:50
13/01 13	40	15:10	15:50
14/01 14	40	15:10	15:50
15/01 15	40	15:10	15:50
16/01 16	40	15:10	15:50
17/01 17	40	15:10	15:50
18/01 18	40	15:10	15:50
19/01 19	40	15:10	15:50
20/01 20	40	15:10	15:50

21/01 21	50	15:10	16:00
22/01 22	50	15:10	16:00
23/01 23	50	15:10	16:00
24/01 24	50	15:10	16:00
25/01 25	50	15:10	16:00
26/01 26	50	15:10	16:00
27/01 27	50	15:10	16:00
28/01 28	50	15:10	16:00
29/01 29	50	15:10	16:00
30/01 30	50	15:10	16:00
31/01 31	50	15:10	16:00
01/02 32	50	15:10	16:00
02/02 33	50	15:10	16:00
03/02 34	50	15:10	16:00
04/02 35	50	15:10	16:00
05/02 36	50	15:10	16:00
06/02 37	50	15:10	16:00
07/02 38	50	15:10	16:00
08/02 39	50	15:10	16:00
09/02 40	40	15:20	16:00
10/02 41	40	15:20	16:00
11/02 42	40	15:20	16:00
12/02 43	30	15:20	15:50
13/02 44	30	15:20	15:50
14/02 45	30	15:20	15:50
15/02 46	30	15:20	15:50
16/02 47	20	15:30	15:50
17/02 48	10	15:30	15:40
23/10 296	10	15:00	15:10
24/10 297	20	15:00	15:20
25/10 298	30	14:50	15:20
26/10 299	30	14:50	15:20
27/10 300	30	14:50	15:20
28/10 301	30	14:50	15:20
29/10 302	30	14:50	15:20
30/10 303	40	14:50	15:30
31/10 304	40	14:50	15:30
01/11 305	50	14:40	15:30
02/11 306	50	14:40	15:30
03/11 307	50	14:40	15:30
04/11 308	50	14:40	15:30
05/11 309	50	14:40	15:30
06/11 310	50	14:40	15:30
07/11 311	50	14:40	15:30
08/11 312	50	14:40	15:30
09/11 313	50	14:40	15:30

10/11 314	50	14:40	15:30
11/11 315	50	14:40	15:30
12/11 316	50	14:40	15:30
13/11 317	50	14:40	15:30
14/11 318	50	14:40	15:30
15/11 319	50	14:40	15:30
16/11 320	50	14:40	15:30
17/11 321	50	14:40	15:30
18/11 322	50	14:40	15:30
19/11 323	50	14:40	15:30
20/11 324	50	14:40	15:30
21/11 325	50	14:40	15:30
22/11 326	40	14:50	15:30
23/11 327	40	14:50	15:30
24/11 328	40	14:50	15:30
25/11 329	40	14:50	15:30
26/11 330	40	14:50	15:30
27/11 331	40	14:50	15:30
28/11 332	40	14:50	15:30
29/11 333	40	14:50	15:30
30/11 334	40	14:50	15:30
01/12 335	40	14:50	15:30
02/12 336	40	14:50	15:30
03/12 337	40	14:50	15:30
04/12 338	30	15:00	15:30
05/12 339	30	15:00	15:30
06/12 340	30	15:00	15:30
07/12 341	20	15:00	15:20
08/12 342	20	15:00	15:20
09/12 343	20	15:00	15:20
10/12 344	20	15:00	15:20
11/12 345	20	15:00	15:20
12/12 346	10	15:10	15:20
13/12 347	10	15:10	15:20
14/12 348	10	15:10	15:20
15/12 349	10	15:10	15:20
16/12 350	10	15:10	15:20
17/12 351	10	15:10	15:20
26/12 360	10	15:20	15:30
27/12 361	10	15:20	15:30
28/12 362	10	15:20	15:30
29/12 363	10	15:20	15:30
30/12 364	10	15:20	15:30
31/12 365	10	15:20	15:30

Table 29 - Project: Project Name - Shadow Flicker Data - Turbine ID:1 Libman

Attachment D-9
IPBC Noise Regulations

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE H: NOISE
CHAPTER I: POLLUTION CONTROL BOARD

PART 901
SOUND EMISSION STANDARDS AND LIMITATIONS FOR PROPERTY LINE-NOISE-SOURCES

AUTHORITY: Implementing Section 25 and authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/25 and 27].

SOURCE: Originally filed as Part 2 of Chapter 8: Noise Pollution, effective August 10, 1973; amended at 2 Ill. Reg. 27, p. 223, effective June 26, 1978; amended at 5 Ill. Reg. 6371, effective June 1, 1981; amended at 5 Ill. Reg. 8533, effective August 10, 1981; amended at 6 Ill. Reg. 10960, effective September 1, 1982; codified at 7 Ill. Reg. 13646; amended at 7 Ill. Reg. 14519, effective October 17, 1983; amended in R83-35 at 8 Ill. Reg. 18893, effective September 25, 1984; amended in R83-33, 26, 29, 30 and R83-34 at 9 Ill. Reg. 1405, effective January 17, 1985; Section 901.105(f)(1), (2) and (3) recodified to Sections 901.110, 901.111 and 901.112 at 9 Ill. Reg. 7147; amended in R83-25, 31 and 32 at 9 Ill. Reg. 7149, effective May 7, 1985; amended in R83-7 at 11 Ill. Reg. 3136, effective January 28, 1987; amended in R04-11, at 28 Ill. Reg. 11910, effective July 30, 2004; amended in R03-9 at 30 Ill. Reg.5533, effective March 10, 2006; amended in R06-11 at 31 Ill. Reg. 1984, effective January 12, 2007.

Section 901.101 Classification of Land According to Use

a) The land use classification system used for the purposes of applying numeric sound standards for this Part is based on the Land-Based Classification Standards (LBCS) (Jeer, Sanjay. 2001. Land-Based Classification Standards . Online, http://www.planning.org/LBCS. American Planning Association: Chicago, Illinois). The LBCS applicable to this Part is set forth in Appendix B.

b) Class A land includes all land used as specified by LBCS Codes 1000 through 1340, 2410 through 2455, 5200 through 5230, 5500, 6100 through 6145, 6222, 6510 through 6530, 6568 through 6600.

c) Class B land includes all land used as specified by LBCS Codes 2100 through 2336, 2500 through 2720, 3500 through 3600, 4220 through 4243, 5100 through 5160, 5300 through 5390, 5400, 6147, 6210 through 6221, 6300 through 6320, 6400 through 6430, 6560 through 6567, 6700 through 6830, 7100 through 7380.

d) Class C land includes all land used as specified by LBCS Codes 3100 through 3440, 4120 through 4180, 4210 through 4212, 4300 through 4347, 7400 through 7450, 8000 through 8500, and 9100 through 9520.

e) A parcel or tract of land used as specified by LBCS Code 9100, 9400, or 5500 when adjacent to Class B or C land may be classified similarly by action of a municipal government having zoning jurisdiction over such land. Notwithstanding any subsequent changes in actual land use, land so classified retains such B or C classification until the municipal government removes the classification adopted by it.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.102 Sound Emitted to Class A Land

a) 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 table, 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.

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

b) Except as provided elsewhere in this Part, no person shall cause or allow the emission of sound during nighttime 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 table, 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.

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: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.103 Sound Emitted to Class B Land

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

Octave Band Center Frequency (Hertz)	Allowable Octave Band Sound Pressure Levels (dB) of Sound Emitted to any Receiving Class B Land from		
	Class C Land	Class B Land	Class A Land
31.5	80	79	72

63	79	78	71
125	74	72	65
250	69	64	57
500	63	58	51
1000	57	52	45
2000	52	46	39
4000	48	41	34
8000	45	39	32

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.104 Highly-Impulsive Sound

Except as provided elsewhere in this Part, no person shall cause or allow the emission of highly-impulsive sound from any property-line-noise-source located on any Class A, B, or C land to any receiving Class A or B land which exceeds the allowable A-weighted sound levels, measured with fast dynamic characteristic, specified in the following table when measured in accordance with the procedure of 35 Ill. Adm. Code 900.103 at any point within such receiving Class A or B land, provided, however, that no measurement of sound levels shall be made less than 25 feet from such property-line-noise-source.

Classification of Land on which Property-Line Noise-Source: is Located	Allowable A-weighted Sound Levels in Decibels of Highly-Impulsive Sound Emitted to Receiving Class A or B Land		
	Class B Land	Class A Land	
		Daytime	Nighttime
Class A Land	47	47	37
Class B Land	54	47	37
Class C Land	58	53	43

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.105 Impact Forging Operations

a) For purposes of this Section, only the following are applicable:

1) Daytime hours means any continuous 16-hour period between 6:00 a.m. and 11:00 p.m. local time; and

2) Nighttime hours means those 8 hours between 10:00 p.m. and 7:00 a.m. which are not part of the 16 continuous daytime hours.

3) The reference time for L_{eq}, as defined in 35 Ill. Adm. Code 900.101 is one hour.

4) New Impacting Forging Operation is that property-line-noise-source comprised of impact forging operation on which construction began after September 1, 1982.

5) Existing Impact Forging Operation is that property-line-noise-source comprised of impact forging operations which are in existence on September 1, 1982,

b) Emission Limitations for New Impact Forging Operation.
No impact forging operation shall cause or allow the emission of impulsive sound to any receiving Class A or B land which exceeds the allowable sound levels specified in the following table when measured at any point within such receiving land, provided however, that no measurement of sound levels shall be made less than 25 feet from such new impact forging operation's property-line.

Allowable Highly- Impulsive Sound Levels (L_{eq}) in Decibels Emitted
To Class A or B Land from New
Impact Forging Operation

Class B Land	Class A Land	
	Daytime	Nighttime
59.5	53.5	48.5

c) Limitations for Existing Impact Forging Operation

No existing impact forging operation shall cause or allow the emission of highly-impulsive sound to any receiving Class A or B land which exceeds the allowable sound levels specified in the following table, when measured at any point within such receiving land, provided however, that no measurement of sound levels shall be made less than 25 feet from such existing impact forging operation's property-line, unless such forging operation is granted a permanent site specific allowable operational level pursuant to subsection (d).

Allowable Highly- Impulsive Sound Levels (L_{eq}) in Decibels Emitted
To Class A or B Land from Existing
Impact Forging Operation

Class B Land	Class A Land	
	Daytime	Nighttime
64.5	58.5	53.5

d) Site Specific Allowable Operational Level for Existing Impact Forging Operation

1) An existing impact forging operation which does not comply with subsection (c) may seek a permanent site specific allowable operational level from the Board. A permanent site specific level is that level of operation allowed petitioner after

review and approval by the Board and after implementation of abatement measures, if any, approved by the Board.

2) Any existing impact forging operation seeking a permanent site specific operational level must submit as its petition the following:

A) The location of the petitioner, a description of the surrounding community, and a map locating the petitioner within the community;

B) A description of the petitioner's operations, the number and size of the petitioner's forging hammers, the current hours of hammer operation, the approximate number of forgings manufactured during each of the three prior calendar years and the approximate number of hammer blows used to manufacture the forgings.

C) A description of any existing sound abatement measure.

D) The sound levels in excess of those permitted by subsection (c) emitted by the petitioner into the community, in 5 decibel increments measured in L_{eq}, shown on the map of the community.

E) The number of residences exposed to sound levels in excess of those permitted by subsection (c);

F) A description of other significant sources of noise (mobile and stationary) and their location shown on the map of the community;

G) A description of the proposed operational level and proposed physical abatement measures, if any, a schedule for their implementation and their costs;

H) The predicted improvement in community sound levels as a result of implementation of the proposed abatement measures; and

I) A description of the economic and technical considerations which justify the permanent site specific allowable operational level sought by petitioner.

e) Land Use Classifications Preserved

The land use classifications in effect within a one-mile radius of an existing impact forging operation on September 1, 1982 remains the applicable land use classification for enforcement of these rules against an existing forging operation and any future modification thereof, regardless of actual subsequent changes in land use unless such actual changes would impose less restrictive limitations on the impact forging operations.

f) Site-Specific Operational Levels

Each individual existing forging operation identified in Sections 901.110, 901.111 and 901.112 must comply with the site-specific operational level defined, or is otherwise subject to Section 901.105(c).

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.106 Prominent Discrete Tones

a) No person shall cause or allow the emission of any prominent discrete tone from any property-line-noise-source located on any Class A, B or C land to any receiving Class A, B or C land, provided, however, that no measurement of one-third octave band sound pressure levels shall be made less than 25 feet from such property-line source.

b) This rule shall not apply to prominent discrete tones having a one-third octave band sound pressure level 10 or more dB below the allowable octave band sound pressure level specified in Sections 901.102 through 901.104 for the octave band which contains such one-third octave band. In the application of this sub-section, the applicable numeric standard for sound emitted from any existing property-line-noise-source to receiving Class A land, for both daytime and nighttime operations, is found in Section 901.102(a).

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.107 Exceptions

a) Sections 901.102 through 901.106 inclusive does not apply to sound emitted from land used as specified by LBCS Codes 1100, 6600 and 5500.

b) Sections 901.102 through 901.106 inclusive does not apply to sound emitted from emergency warning devices and unregulated safety relief valves.

c) Sections 901.102 through 901.106 inclusive does not apply to sound emitted from lawn care maintenance equipment and agricultural field machinery used during daytime hours. For the purposes of this sub-section, grain dryers operated off the farm are not considered agricultural field machinery.

d) Sections 901.102 through 901.106 inclusive do not apply to sound emitted from equipment being used for construction.

e) Section 901.102(b) do not apply to sound emitted from existing property-line-noise-sources during nighttime hours, provided, however, that sound emitted from such existing property-line-noise-sources are governed during nighttime hours by the limits specified in Section 901.102.

f) Sections 901.102 through 901.106 inclusive do not apply to the operation of any vehicle registered for highway use while such vehicle is being operated within any land used as specified by Section 901.101 in the course of ingress to or egress from a highway.

g) Sections 901.102 through 901.106 inclusive do not apply to sound emitted from land used as specified by LBCS Codes 5130 and 5140 when used for automobile and motorcycle racing; and, any land used for contests, rallies, time trials, test runs or similar operations of any self-propelled device, and upon or by which any person is or may be transported or drawn, when such self-propelled device is actually being used for sport or recreation and is actually participating in an activity or event organized, regulated, and supervised under the sponsorship and sanction of a club, organization or corporation having national or statewide recognition; provided, however, that the exceptions granted in this subsection do not apply to any automobile and motorcycle race, contest, rally, time trial, test run or similar operation of any self-propelled device if such event is started between the hours of 10:30 p.m. to 7:00 a.m., local time weekdays, or between the hours of 11:00 p.m. and 7:00 a.m., local time, weekend days.

h) Section 901.104 shall not apply to impulsive sound produced by explosive blasting activities conducted on any Class C land other than the land used as specified by LBCS Codes 8300 and 8500, but such operations shall be governed by Section 901.109.

i) Part 901 shall not apply to impulsive sound produced by explosive blasting activities, which are:

   1) Conducted on any Class C land used as specified by LBCS Codes 8300 and 8500; and

   2) Regulated by the Department of Natural Resources in accordance with Section 6.5 of the Surface-Mined Land Conservation and Reclamation Act [225 ILCS 715/6.5] and Section 3.13 of the Surface Coal Mining Land Conservation and Reclamation Act [225 ILCS 720/3.13].

j) Sections 901.102 through 901.106 inclusive do not apply to sound emitted from snowmobiles.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.108 Compliance Dates for Part 901

a) Except as provided in subsections (g), (i), and (j), every owner or operator of a new property-line-noise-source must comply with the standards and limitations of this Part on and after August 10, 1973.

b) Except as otherwise provided in this rule, every owner or operator of an existing property-line-noise-source must comply with the standards and limitations of this Part on and August 10, 1974.

c) Every owner or operator of an existing property-line-noise-source who emits sound which exceeds any allowable octave band sound pressure level of Section 901.102 or 901.103 by 10 dB or more in any octave band with a center frequency of 31.5 Hertz, 63 Hertz or 125 Hertz must comply with the standards and limitations of this Part on and after February 10, 1975.

d) Except as provided in subsections (g) and (h), every owner or operator of an existing property-line-noise-source required to comply with Section 901.104 must comply with the standards and limitations of this Part on and after February 10, 1975.

e) Every owner or operator of an existing property-line-noise-source required to comply with Section 901.106 must comply with the standards and limitations of this Part on and after February 10, 1975.

f) Every owner or operator of Class C land now and hereafter used as specified by LBCS Code 4120 will have until August 10, 1976 to bring the sound from railroad car coupling in compliance with Section 901.104.

g) Existing impact forging operations as defined in Section 901.105 which do not seek permanent site specific allowable operational levels must comply with Section 901.105 by December 1, 1983. Those seeking permanent site specific allowable operational levels pursuant to Section 901.105(d) must comply as of the effective date of the site specific rule granted or denied.

h) Every owner or operator of Class C land now or hereafter used as specified by LBCS Code 3310 must comply with the standards and limitations of this Part on August 10, 1975.

i) Every owner or operator of Class C land now or hereafter used as specified by LBCS Code 5130 and 5140 when used for automobile and motorcycle racing must comply with the standards and limitations of this Part on February 10, 1976.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.109 Highly-Impulsive Sound From Explosive Blasting

a) During the daytime hours that cover the period after sunrise and before sunset, no person shall cause or allow any explosive blasting conducted on any Class C land other than land used as specified by LBCS Codes 8300 and 8500 so as to allow the emission of sound to any receiving Class A or B land which exceeds the allowable outdoor C-weighted sound levels, measured with the slow dynamic characteristic, specified in the following table, when measured at any point, of reasonable interference with the use of such receiving Class A or B land.

Allowable Outdoor C-Weighted
Sound Exposure Levels in Decibels of Explosive

Blasting Sounds Emitted to Receiving
Class A or B Land from Any Class C Land other than Land
Used as Specified by LBCS Code 8300 or 8500

Receiving Class A Land	Receiving Class B Land
107	112

The allowable sound exposure level limits in the above table must be lowered by three decibels (3 dB) for each doubling of the number of blasts during the day or night.

b) Compliance with outdoor peak sound pressure level limits in the following table shall constitute prima facie level limits of this rule when measured on such receiving Class A or B land.

Equivalent Maximum Sound Pressure Level (Peak) Limits in Decibels

Lower Frequency Limit of Measuring System for Flat Response, a Variation from Linear Response of + or - 3dB (Hz)	Receiving Class A Land (dB)	Receiving Class B Land (dB)
< 2.0 but > 0.1	133	133

c) During the period defined by both the beginning of the nighttime hours (10:00 pm) or sunset, whichever occurs earlier, and the ending of the nighttime hours (7:00 am) or sunrise, whichever occurs later, the allowable sound level limits in subsections (a) and (b) must be reduced by 10 decibels except in emergency situations where rain, lightning, other atmospheric conditions, or operator or public safety requires unscheduled nighttime hour explosive blasting.

d) Persons causing or allowing explosive blasting to be conducted on any Class C land other than land used as specified by LBCS Code 8300 or 8500 must notify the local public of such blasting prior to its occurrence, except when emergency situations require unscheduled blasting, by publication of a blasting schedule, identifying the work days or dates and time periods when explosives are expected to be detonated, at least every three months in a newspaper of general circulation in the locality of the blast site.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.110 Amforge Operational Level

Amforge Division of Rockwell International located at 119th Street, Chicago, Illinois must:

a) Operate only ten forging hammers at any one time;

b) Operation of its forging hammers is limited to the hours of 7:00 a.m. through 11:00 p.m., with occasional operations beginning at 6:00 a.m. and ending at midnight, Monday through Saturdays; and

c) Install sound absorptive materials on each of the forging hammer structures as each is routinely overhauled, but no later than January 1, 1987.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.111 Modern Drop Forge Operational Level

Modern Drop Forge Company located at 139th Street and Western Avenue in Blue Island, Illinois must:

a) Operate only twenty-one forging hammers at any one time; and

b) Operate its forging hammers only during the hours of 6:00 a.m. through midnight, Mondays through Fridays, and 6:30 a.m. until 7:30 p.m. on Saturdays.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.112 Wyman-Gordon Operational Level

Wyman-Gordon Company located at 147th Street and Wood Street, Harvey, Illinois shall:

a) Operate only six forging hammer units, each consisting of two hammers, after January 1, 1984.

b) Operate forging units in Buildings 6 and 7, located at the southern perimeter of the Wyman-Gordon Company's Harvey facility, to produce no more than 20% of the total annual hammer production at the Harvey facility;

c) Operate forging units between the hours of 6:00 a.m. and midnight; limit forging operations on Saturdays and Sundays to no more than half a year's total; and limit forging operations during the hours of 6:00 a.m. and 7:00 a.m. and 11:00 p.m. and midnight to less than 2% of the Harvey's facility total annual hammer production; and

d) Consolidate the two existing steel inventory yards at the one located north of Building 75 no later than January 1, 1984.

(Source: Recodified from Section 901.105(f)(3) at 9 Ill. Reg. 7147)

Section 901.113 Wagner Casting Site-Specific Operational Level (Repealed)

(Source: Repealed at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.114 Moline Forge Operational Level

Moline Forge and future owners of the forging facility located at 4101 Fourth Avenue, Moline, Illinois, shall comply with the following site-specific operational level:

a) Operate no more than nine forging hammers at any one time; and

b) Operate its forging hammers only between the hours of 6:00 a.m. until 11:00 p.m. Monday through Friday and from 6:00 a.m. until 3:30 p.m. on Saturdays.

(Source: Added at 9 Ill. Reg. 1405, effective January 17, 1985)

Section 901.115 Cornell Forge Hampshire Division Site-Specific Operational Level

Cornell Forge, Hampshire Division and future owners of the forging facility located at Walker Road, Hampshire, Illinois, shall comply with the following site-specific operational level:

a) Operate no more than seven forging hammers at any one time; and

b) Operate its forging hammers only on Monday through Saturday between the hours of 7:00 a.m. to 3:30 p.m. with an additional shift that may run from either 3:30 p.m. to 12:00 p.m. or from 10:30 p.m. to 7:00 a.m.

(Source: Added at 9 Ill. Reg. 1405, effective January 17, 1985)

Section 901.116 Forgings and Stampings, Inc. Operational Level

Forgings and Stampings, Inc. and future owners of the forging facility located at 1025 23rd Avenue, Rockford, Illinois, shall comply with the following site-specific operational level:

a) Operate no more than six forging hammers at any one time; and

b) Operate its forging hammers only between the hours of 6:00 a.m. and 6:00 p.m. Monday through Friday and 6:00 a.m. and 2:00 p.m. on Saturday.

(Source: Added at 9 Ill. Reg. 1405, effective January 17, 1985)

Section 901.117 Rockford Drop Forge Company Operational Level

Rockford Drop Forge Company and future owners of the forging facility located at 2031 Ninth Street, Rockford, Illinois, shall comply with the following site-specific operational level:

a) Operate no more than twelve forging hammers at any one time; and

b) Operate its forging hammers only between the hours of 6:00 a.m. and 10:00 p.m. Monday through Saturday.

(Source: Added at 9 Ill. Reg. 1405, effective January 17, 1985)

Section 901.118 Scot Forge Company – Franklin Park Division Operational Level

Scot Forge and future owners of the forging facility located at 9394 W. Belmont Avenue, Franklin Park, Illinois, must comply with the following site-specific operational level:

a) Operate no more than seven forging hammers at any one time; and

b) Operate its forging hammers only between the hours of 6:00 a.m. and 6:00 p.m. Monday through Saturday.

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Section 901.119 Clifford-Jacobs Operational Level

Clifford-Jacobs Forging Company and future owners of the forging facility located at North Market Street, Champaign, Illinois, shall comply with the following site-specific operational level:

a) Operate no more than fourteen hammers at any one time; and

b) Operate its forging hammers only between the hours of 6:00 a.m. and 11:00 p.m. Monday through Saturday.

(Source: Added at 9 Ill. Reg. 7149, effective May 7, 1985)

Section 901.120 C.S. Norcross Operational Level

C.S. Norcross & Sons Company and future owners of the forging facility located at the intersection of Davis and Dean Streets, Bushnell, Illinois, shall comply with the following site-specific operational level:

a) Operate no more than twelve forging hammers at any one time; and

b) Operate its forging hammers only between the hours of 7:00 a.m. and 1:00 a.m. Monday through Saturday.

(Source: Added at 9 Ill. Reg. 7149, effective May 7, 1985)

Section 901.121 Vaughan & Bushnell Operational Level

Vaughan & Bushnell Manufacturing Company and the future owners of the forging facility located at the intersection of Davis and Main Streets, Bushnell, Illinois, must comply with the following site-specific operational level:

a) Operate no more than ten hammers at any one time; and

b) Vaughan & Bushnell may operate 24 hours per day, Monday through Sunday.

(Source: Amended at 31 Ill. Reg. 1984, effective January 12, 2007)

Section 901.122 Ameren Elgin Facility Site-Specific Noise Emission Limitations

The Combustion Turbine Power Generation Facility located at 1559 Gifford Road in Elgin, Illinois shall not cause or allow the emission of sound from any property-line-noise source located on that property which exceeds any allowable octave band sound pressure level specified in the following table, when measured at any point within the receiving Class A or Class B land.

Octave Band Center Frequency (Hertz)	Allowable Octave Band Sound Pressure Levels (dB) of Sound Emitted to any Receiving Class A or Class B Land from Ameren Elgin Facility	
	Class A Land	Class B Land
31.5	80	80
63	74	79
125	69	74
250	64	69
500	58	63
1000	58	58
2000	58	58
4000	50	50
8000	40	45

(Source: Added at 28 Ill. Reg.11910, effective July 30, 2004)

Section 901.APPENDIX A Old Rule Numbers Referenced

The following table is provided to aid in referencing old Board rule numbers to section numbers pursuant to codification.

Old Part 2 of Chapter 8	35 Ill. Adm. Code Part 901

Rule 201	Section 901.101
Rule 202	Section 901.102(a)
Rule 203	Section 901.102(b)
Rule 204	Section 901.103
Rule 205	Repealed
Rule 205 (was old 206)	Section 901.104
Rule 206 (new rule)	Section 901.105
Rule 207	Section 901.106
Rule 208	Section 901.107
Rule 209	Section 901.108
Rule 210	Section 901.109
Added in Codification	Appendix A
Unnumbered Appendix to Chapter 8, Part 2	Appendix B

Section 901.APPENDIX B Land-Based Classification Standards and Corresponding 35 Ill. Adm. Code 901 Land Classes

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
Residence or accommodation functions	**1000**	Residence or accommodation functions	**A**
	1100	Private household	
	1200	Housing services for the elderly	
	1210	Retirement housing services	
	1220	Congregate living services	
	1230	Assisted-living services	
	1240	Life care or continuing care services	
	1250	Skilled-nursing services	
	1300	Hotels, motels, or other accommodation services	
	1310	Bed and breakfast inn	
	1320	Rooming and boarding	
	1330	Hotel, motel, or tourist court	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	1340	Casino hotel	**A**
General sales or services	**2000**	General sales or services	
	2100	Retail sales or service	**B**
	2110	Automobile sales or service establishment	
	2111	Car dealer	
	2112	Bus, truck, mobile homes, or large vehicles	
	2113	Bicycle, motorcycle, ATV, etc.	
	2114	Boat or marine craft dealer	
	2115	Parts, accessories, or tires	
	2116	Gasoline service	
	2120	Heavy consumer goods sales or service	
	2121	Furniture or home furnishings	
	2122	Hardware, home centers, etc.	
	2123	Lawn and garden supplies	
	2124	Department store, warehouse club or superstore	
	2125	Electronics and Appliances	
	2126	Lumber yard and building materials	
	2127	Heating and plumbing equipment	
	2130	Durable consumer goods sales and service	
	2131	Computer and software	
	2132	Camera and photographic supplies	
	2133	Clothing, jewelry, luggage, shoes, etc.	
	2134	Sporting goods, toy and hobby, and musical instruments	
	2135	Books, magazines, music, stationery	
	2140	Consumer goods, other	
	2141	Florist	
	2142	Art dealers, supplies, sales and service	
	2143	Tobacco or tobacconist establishment	
	2144	Mail order or direct selling establishment	
	2145	Antique shops, flea markets, etc.	
	2150	Grocery, food, beverage, dairy, etc.	
	2151	Grocery store, supermarket, or bakery	
	2152	Convenience store	
	2153	Specialty food store	
	2154	Fruit and vegetable store	
	2155	Beer, wine, and liquor store	
	2160	Health and personal care	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	2161	Pharmacy or drug store	
	2162	Cosmetic and beauty supplies	
	2163	Optical	
	2200	Finance and Insurance	
	2210	Bank, credit union, or savings institution	
	2220	Credit and finance establishment	
	2230	Investment banking, securities, and brokerages	
	2240	Insurance-related establishment	
	2250	Fund, trust, or other financial establishment	
	2300	Real estate, and rental and leasing	
	2310	Real estate services	
	2320	Property management services	
	2321	Commercial property-related	
	2322	Rental housing-related	
	2330	Rental and leasing	
	2331	Cars	
	2332	Leasing trucks, trailers, RVs, etc.	
	2333	Recreational goods rental	
	2334	Leasing commercial, industrial machinery, and equipment	
	2335	Consumer goods rental	
	2336	Intellectual property rental (video, music, software, etc.)	**B**
	2400	Business, professional, scientific, and technical services	
	2410	Professional services	**A**
	2411	Legal services	
	2412	Accounting, tax, bookkeeping, payroll services	
	2413	Architectural, engineering, and related services	
	2414	Graphic, industrial, interior design services	
	2415	Consulting services (management, environmental, etc.)	
	2416	Research and development services (scientific, etc.)	
	2417	Advertising, media, and photography services	
	2418	Veterinary services	
	2420	Administrative services	
	2421	Office and administrative services	
	2422	Facilities support services	
	2423	Employment agency	
	2424	Business support services	
	2425	Collection agency	
	2430	Travel arrangement and reservation services	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	2440	Investigation and security services	
	2450	Services to buildings and dwellings	
	2451	Extermination and pest control	
	2452	Janitorial	
	2453	Landscaping	
	2454	Carpet and upholstery cleaning	
	2455	Packing, crating, and convention and trade show services	**A**
	2500	Food services	**B**
	2510	Full-service restaurant	
	2520	Cafeteria or limited service restaurant	
	2530	Snack or nonalcoholic bar	
	2540	Bar or drinking place	
	2550	Mobile food services	
	2560	Caterer	
	2570	Food service contractor	
	2580	Vending machine operator	
	2600	Personal services	
	2700	Pet and animal sales or service (except veterinary)	
	2710	Pet or pet supply store	
	2720	Animal and pet services	**B**
Manufacturing and wholesale trade	**3000**	Manufacturing and wholesale trade	
	3100	Food, textiles, and related products	**C**
	3110	Food and beverages	
	3120	Tobacco manufacturing establishment	
	3130	Textiles	
	3140	Leather and allied products	
	3200	Wood, paper, and printing products	
	3210	Wood products establishment	
	3220	Paper and printing materials	
	3230	Furniture and related products	
	3300	Chemicals, and metals, machinery, and electronics manufacturing	
	3310	Petroleum and coal products	
	3320	Chemicals, plastics, and rubber products	
	3330	Nonmetallic mineral products	
	3340	Primary metal manufacturing	
	3350	Machinery manufacturing	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	3360	Electrical equipment, appliance, and components manufacturing	
	3370	Transportation equipment, automobiles, etc.	
	3400	Miscellaneous manufacturing	
	3410	Jewelry and silverware	
	3420	Dolls, toys, games, and musical instruments	
	3430	Office supplies, inks, etc.	
	3440	Signs	**C**
	3500	Wholesale trade establishment	**B**
	3510	Durable goods	
	3520	Nondurable goods	
	3600	Warehouse and storage services	**B**
Transportation, communication, information, and utilities	**4000**	Transportation, communication, information, and utilities	
	4100	Transportation services	
	4110	**Air transportation**	**U**
	4111	Air passenger transportation	
	4112	Air freight transportation	
	4113	Airport and support establishment	
	4114	Aircraft and accessories	
	4115	Other air transportation (including scenic, balloon, etc.)	**U**
	4120	Rail transportation	**C**
	4121	Rail passenger transportation	
	4122	Rail freight transportation	
	4123	Rail transportation support establishment	
	4130	Road, ground passenger, and transit transportation	
	4131	Local transit systems-mixed mode	
	4132	Local transit systems-commuter rail	
	4133	Local transit systems-bus, special needs, and other motor vehicles	
	4134	Interurban, charter bus, and other similar establishments	
	4135	School and employee bus transportation	
	4136	Special purpose transit transportation (including scenic, sightseeing, etc.)	
	4137	Taxi and limousine service	
	4138	Towing and other road and ground services	
	4140	Truck and freight transportation services	
	4141	General freight trucking, local	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	4142	General freight trucking, long-distance	
	4143	Freight trucking, specialized (used household and office goods)	
	4144	Freight trucking, specialized (except used goods)	
	4150	Marine and water transportation	
	4151	Marine passenger transportation	
	4152	Marine freight transportation	
	4153	Marine port and harbor operations	
	4154	Marine cargo handling and dry dock services	
	4155	Marine navigational and other services	
	4160	Courier and messenger services	
	4170	Postal services	
	4180	Pipeline transportation	**C**
	4200	Communications and information	
	4210	Publishing	**C**
	4211	Newspapers, books, periodicals, etc.	**C**
	4212	Software publisher	**C**
	4220	Motion pictures and sound recording	**B**
	4221	Motion picture and video production, publishing, and distribution	
	4222	Motion picture viewing and exhibition services	
	4223	Sound recording, production, publishing, and distribution	
	4230	Telecommunications and broadcasting	
	4231	Radio and television broadcasting	
	4232	Cable networks and distribution	
	4233	Wireless telecommunications	
	4234	Telephone and other wired telecommunications	
	4240	Information services and data processing industries	
	4241	Online information services	
	4242	Libraries and archives	
	4243	News syndicate	**B**
	4300	Utilities and utility services	**C**
	4310	Electric power	
	4311	Hydroelectric	
	4312	Fossil	
	4313	Nuclear	
	4314	Alternative energy sources	
	4320	Natural gas, petroleum, fuels, etc.	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	4330	Water, steam, air conditioning supply	
	4331	Drinking water	
	4332	Irrigation and industrial water supply	
	4333	Air conditioning and steam supply	
	4340	Sewer, solid waste, and related services	
	4341	Hazardous waste collection	
	4342	Hazardous waste treatment and disposal	
	4343	Solid waste collection	
	4344	Solid waste combustor or incinerator	
	4345	Solid waste landfill	
	4346	Waste treatment and disposal	
	4347	Septic tank and related services	C
Arts, entertainment, and recreation	**5000**	Arts, entertainment, and recreation	
	5100	Performing arts or supporting establishment	**B**
	5110	Theater, dance, or music establishment	
	5120	Sports team or club	
	5130	Racetrack establishment	
	5140	Promoter of performing arts, sports, and similar events	
	5150	Agent for management services	
	5160	Independent artist, writer, or performer	**B**
	5200	Museums and other special purpose recreational institutions	**A**
	5210	Museum	
	5220	Historical or archeological institution	
	5230	Zoos, botanical gardens, arboreta, etc.	**A**
	5300	Amusement, sports, or recreation establishment	**B**
	5310	Amusement or theme park establishment	
	5320	Games arcade establishment	
	5330	Casino or gambling establishment	
	5340	Miniature golf establishment	
	5350	Skiing	
	5360	Marina or yachting club facility operators	
	5370	Fitness, recreational sports, gym, or athletic club,	
	5380	Bowling, billiards, pool, etc.	
	5390	Skating rinks, roller skates, etc.	
	5400	Camps, camping, and related establishments	**B**
	5500	Natural and other recreational parks	**A**

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
Education, public admin., health care, and other inst.	**6000**	Education, public admin., health care, and other inst.	
	6100	Educational services	
	6110	Nursery and preschool	**A**
	6120	Grade schools	
	6121	Elementary	
	6122	Middle	
	6123	Senior	
	6124	Continuance	
	6125	Alternate education services	
	6126	Adult education services	
	6130	Colleges and universities	
	6140	Technical, trade, and other specialty schools	
	6141	Beauty schools	
	6142	Business management	
	6143	Computer training	
	6144	Driving education	
	6145	Fine and performing arts education	**A**
	6146	Flight training	**U**
	6147	Sports and recreation education	**B**
	6200	Public administration	
	6210	Legislative and executive functions	**B**
	6220	Judicial functions	**B**
	6221	Courts	**B**
	6222	Correctional institutions	**A**
	6300	Other government functions	**B**
	6310	Military and national security	
	6320	Space research and technology	
	6400	Public Safety	
	6410	Fire and rescue	
	6420	Police	
	6430	Emergency response	**B**
	6500	Health and human services	
	6510	Ambulatory or outpatient care services	**A**
	6511	Clinics	
	6512	Family planning and outpatient care centers	
	6513	Medical and diagnostic laboratories	
	6514	Blood and organ banks	
	6520	Nursing, supervision, and other rehabilitative services	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	6530	Hospital	**A**
	6560	Social assistance, welfare, and charitable services	**B**
	6561	Child and youth services	
	6562	Child day care	
	6563	Community food services	
	6564	Emergency and relief services	
	6565	Other family services	
	6566	Services for elderly and disabled	
	6567	Veterans affairs	**B**
	6568	Vocational rehabilitation	**A**
	6600	Religious institutions	**A**
	6700	Death care services	**B**
	6710	Funeral homes and services	
	6720	Cremation services and cemeteries	
	6800	Associations, nonprofit organizations, etc.	
	6810	Labor and political organizations	
	6820	Business associations and professional membership organizations	
	6830	Civic, social, and fraternal organizations	**B**
Construction-related businesses	**7000**	Construction-related businesses	
	7100	Building, developing, and general contracting	**B**
	7110	Residential construction	
	7120	Land development and subdivision	
	7130	Industrial, commercial and institutional building construction	
	7200	Machinery related	
	7210	Building equipment and machinery installation contractors	
	7220	Excavation contractor	
	7230	Water well drilling contractor	
	7240	Wrecking and demolition establishment	
	7250	Structural steel erection contractor	
	7300	**Special trade contractor**	
	7310	Carpentry, floor, and tile contractor	
	7320	Concrete contractor	
	7330	Electrical contractor	
	7340	Glass and glazing contractor	
	7350	Masonry and drywall contractors	
	7360	Painting and wall covering	

LBCS Main Category	LBCS Function Code	Description	35 IAC 901 Land Class
	7370	Plumbing, heating, and air-conditioning	
	7380	Roofing, siding, and sheet metal contractors	**B**
	7400	Heavy construction	**C**
	7410	Highway and street construction;	
	7420	Bridge and tunnel construction	
	7430	Water, sewer, and pipeline construction	
	7440	Power lines, communication and transmission lines	
	7450	Industrial and other nonbuilding construction	**C**
Mining and extraction establishments	**8000**	Mining and extraction establishments	**C**
	8100	Oil and natural gas	
	8200	Metals (iron, copper, etc.)	
	8300	Coal	
	8400	Nonmetallic mining	
	8500	Quarrying and stone cutting establishment	**C**
Agriculture, forestry, fishing and hunting	**9000**	Agriculture, forestry, fishing and hunting	
	9100	Crop production	**C**
	9110	Grain and oilseed	
	9111	Wheat	
	9112	Corn	
	9113	Rice	
	9114	Soybean and oilseed	
	9115	Dry pea and bean	
	9120	Vegetable farming or growing services	
	9130	Fruits and trees	
	9140	Greenhouse, nursery, and floriculture	
	9141	Food crops grown under cover	
	9142	Nursery and tree production	
	9143	Floriculture production	
	9150	All other crops	
	9151	Tobacco crop	
	9152	Cotton crop	
	9153	Sugarcane crop	
	9154	Hay	
	9155	Peanut crop	
	9200	Support functions for agriculture	
	9210	Farm and farm labor management services	

LBCS		Description	35 IAC 901 Land Class
Main Category	Function Code		
	9220	Spraying, dusting, and other related services	
	9230	Crop harvesting and post harvest crop activities (including drying, siloing, etc.)	
	9240	Cotton ginning, grist milling, etc.	
	9300	Animal production including slaughter	
	9310	Cattle ranch and crops	
	9311	Beef cattle ranch establishments	
	9312	Cattle feedlot establishment	
	9320	Dairy cattle and milk production	
	9330	Hog and pig farm	
	9340	Poultry and egg production and hatcheries	
	9350	Sheep and goat farming establishments	
	9360	Fish hatcheries, fisheries, and aquaculture	
	9370	All other animal production	
	9371	Apiculture (bees, wax, and related operations)	
	9372	Horse and equine production	
	9373	Fur-bearing animal production	
	9380	Support functions for animal production	
	9400	Forestry and Logging	
	9410	Logging	
	9420	Forest nurseries	
	9430	Support functions for forestry	
	9500	Fishing, hunting and trapping, game preserves	
	9510	Fishing	
	9520	Hunting and trapping, game retreats, game and fishing preserves	**C**
	9900	Unclassifiable function	**U**
	9910	Not applicable to this dimension	
	9990	To be determined	
	9999	To be determined	**U**

(Source: Amended at 30 Ill. Reg.5533, effective March 10, 2006)

Attachment D-10
Microwave Study

LIBMAN
Family made Since 1896!™
220 N. Sheldon • Arcola, Illinois 61910
217-268-4200 • Fax 217-268-3422

July 8, 2010

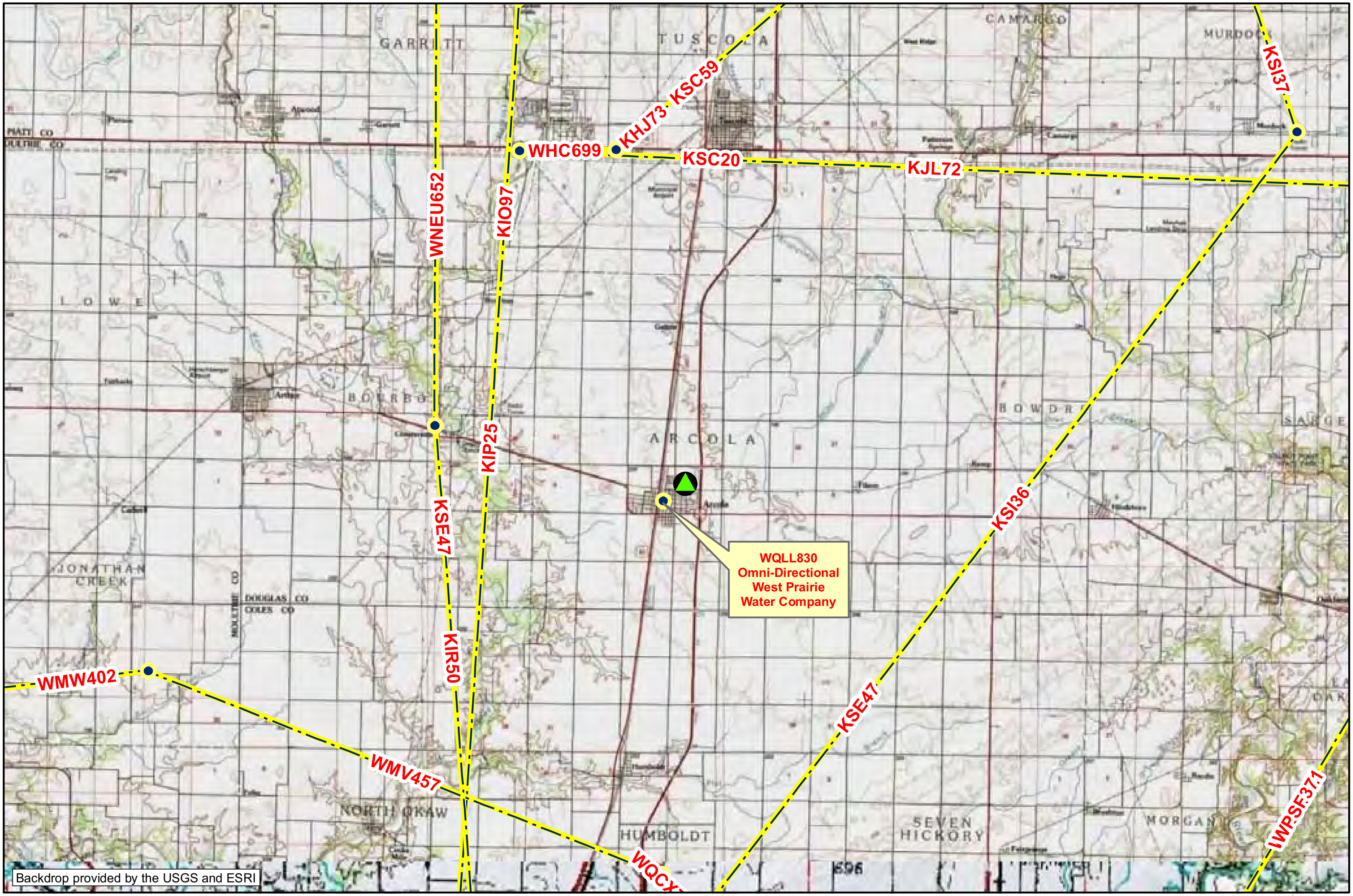
Per requirement g.of the Arcola, Illinois Wind Turbine Permit Application, The Libman Company has provided the applicable microwave transmission providers and local emergency service providers and local emergency provider's copies of the project summary and site plans in the following manner:

1) Hand delivered to John "Corky" Clark, president of the fire district
2) Hand delivered to Bill Wagner, City Manager to be forwarded to the police department

07-08-10

By Ivan Fink

EXHIBIT
Libman
16A



Libman Wind Project
Microwave Study

Wind Turbine Location
Microwave Towers
Microwave Beams

N

Miles
0 1 2 3 4 5

WES ENGINEERING

Carlson Mapping & Analysis LLC
April 26, 2010

Attachment D-11
Stakeholder List and Scoping Letter

EA STAKEHOLDER LIST
Libman Company Wind Energy Project
Arcola, IL (Douglas County)

	Name	Email	Title	Organization	Address 1	City and State	Zip	Phone
	Sarah Sheehan			Office of the Governor	100 W. Randolph, 6-100 - James R. Thompson Cc	Chicago, IL	60601	
	Thomas E. Jennings		Director	Illinois Department of Agriculture	State Fairgrounds, P.O. Box 19281	Springfield, IL	62794-9281	
	Jonathan Feipel		Deputy Director	Illinois Department of Commerce and Economic Opportunity	500 East Monroe (Illinois Energy Office)	Springfield, IL	62701-1643	
	Manuel Florez		Chairman	Illinois Commerce Commission	527 East Capitol Avenue	Springfield, IL	62701	
	Doug Scott		Director	Illinois Environmental Protection Agency	1021 North Grand Ave. East - P.O. Box 19276	Springfield, IL	62794-9276	
	Janet Grimes		Director	Illinois Historic Preservation Agency	1 Old State Capitol Plaza	Springfield, IL	62701-1507	
	Marc Miller		Director	Illinois Department of Natural Resources	1 Natural Resources Way	Springfield, IL	62702-1271	
	Gary Hannig		Secretary, Attn: Barbra Stevens, Environment Section	Illinois Department of Transportation	2300 S. Dirkesn Parkway	Springfield, IL	62764	
	Mark Pruitt		Executive Director	Illinois Power Agency	100 W. Randolph, 6-100 - James R. Thompson Cc	Chicago, IL	60601	
	Phil Wallis		Vice President	National Audubon Society	225 Varick Street, 7th floor	New York, NY	10014	
	Michelle P. Scott		General Counsel	National Audubon Society	225 Varick Street, 7th floor	New York, NY	10014	
	Kim Van Fleet		Biologist National Audubon Society	Important Bird Area Coordinator and Staff	225 Varick Street, 7th floor	New York, NY	10014	
	Eric Glitzenstein			Meyer Glitzenstein & Crystal	1601 Connecticut Ave., N.W., Suite 700	Washington, D.C.	20009-1056	
	William Eubanks			Meyer Glitzenstein & Crystal	1601 Connecticut Ave., N.W., Suite 700	Washington, D.C.	20009-1056	
	Stephen Packard	spackard@audubon.org	Director	Audubon of the Chicago Region	1718 Sherman Avenue #210	Evanston, IL	60201	847-328-1250
	Mr. Joe Williams		NAGPRA Rep	Kickapoo Tribe	1107 Goldfinch Road	Horton, KS	66439	
	Mr. Thomas Cuddy	thomas.cuddy@faa.gov		Federal Aviation Administration- Office of Environment and Energy	800 Independence Avenue, SW, Room 900	Washington, DC	20591	202-493-4018
	Mr. Ken Westlake	westlake.kenneth@epa.gov		EPA Region 5 – IL, IN, MI, MN, OH, WI - NEPA Implementation Office of Enforcement and Compliance Assurance	77 West Jackson Boulevard, Mail Code E-19J	Chicago, IL	60604-3590	312-886-2910
	Dr. James Hartman (Attn: SAIE_ESOH)	james.hartman1@us.army.mil	Assistant Secretary of Army (Installations & Environment) OH, WI Office of Regional Environmental and Government Affairs – North	DOD Region V- IL, IN, MI, MN	5179 Hoadley Rd Aberdeen	Aberdeen Proving Ground, MD	21010-5401	
	Cathy O'Connell	cathy.oconnell@us.army.mil	Army Region 5 Regional Environmental Coordinator	Horne Engineering Services, LLC Office of Regional Environmental and Government Affairs-Northern APG-EA, MD 21010-5401				
	Citizens for Clean Energy, Inc	cce-mt@bresnan.net		Citizens for Clean Energy, Inc.	3417 Fourth Avenue, South	Great Falls, MT	59405	406-453-0725
	Mr. Greer Goldman	ggoldman@audubon.org CC: mdaulton@audubon.org	Assistant General Counsel	National Audubon Society- Audubon Public Policy Office	1150 Connecticut Avenue, NW	Washington, DC	20036	202-861-2242 (ext. 3039)
	Bill Wagoner	Arcola-administrator@consolidated.net	City Administrator	City of Arcola	114 North Locust- Arcola City Hall. PO Box 215	Arcola, IL	61910	217-268-4966
	Laurena (Rena) Cain	dcccao@netcare-il.com	Douglas County Supervisor of Assessments- Supervisor	Douglas County, Illinois	401 South Center Street. Room 103	Tuscola, IL	61953	
	Joshua Truex	http://www.arcolavfd.org/contact-us/ (@arcolavfd.org)	Chief	Arcola Fire Department	117 West Main	Arcola, IL	61910	
	Jud Nogle		Manager	TUSCOLA AIRPORT	880 N. COUNTY RD-900E	Tuscola, IL	61593	217-253-9504
	Andrew Fearn		Manager	COLES COUNTY AIRPORT AUTHORITY	432 AIRPORT ROAD	MATTOON, IL	61938	217-234-7120
				Sierra Club- Prairie Group	P.O. Box 131	Urbana, IL	61803	217-353-5237
				SisterNet	2400 W. Bradley Avenue	Champaign, IL	61821	217-356-9954
	James E. Crane		Engineer	Douglas County	200 S. Prairie	Tuscola, IL	61953	217-253-2113
				Douglas County Health Department	1250 E US Hwy 36	Tuscola, IL	61953	
	James A. Ingram		Clerk & Recorder	Douglas County	401 S. Center St. P.O. Box 467	Tuscola, IL	61953	217-253-2411
	Joseph E. Crowe		Deputy Director, Region 3 Engineer	Illinois Department of Transportation	13473 IL Hwy. 133, P.O. Box 610	Paris, IL	61944-0610	
				Arcola Chamber of Commerce	135 N. Oak Street PO Box 274	Arcola, IL	61910	217-268-4530
				Illinois Heritage Association	602-1/2 E. Green Street	Champaign, IL	61820	217-359-5600
*	Aguilar, Ismelda				216 CIRCLE DRIVE	ARCOLA, IL	61910	

EA STAKEHOLDER LIST
Libman Company Wind Energy Project
Arcola, IL (Douglas County)

*	Resident				401 N. LOCUST ST	ARCOLA, IL	61910	
*	Wilson, Alicia				509 N. LOCUST ST	ARCOLA, IL	61910	
*	Chancellor, C.W.				511 N. LOCUST ST	ARCOLA, IL	61910	
*	Beachy's Ice Company				523 1/2 N. LOCUS	ARCOLA, IL	61910	
*	Beachy, Albert				523 N. LOCUST ST	ARCOLA, IL	61910	
*	Chrisagis, Anthony				601 N. LOCUST ST	ARCOLA, IL	61910	
*	Plummer, Rachael				605 N. LOCUST ST	ARCOLA, IL	61910	
*	Moreno, Juan				202 POLK DR	ARCOLA, IL	61910	
*	Cortez, Sandra				208 POLK DR	ARCOLA, IL	61910	
*	Cantu, Jaime				212 POLK DR	ARCOLA, IL	61910	
*	Franco, Rosa N.				216 POLK DR	ARCOLA, IL	61910	
*	Guzman, Francisco				220 POLK DR	ARCOLA, IL	61910	
*	Cortez, Francisco & Glori				224 POLK DR	ARCOLA, IL	61910	
*	Brummett, Nancy				228 POLK DR	ARCOLA, IL	61910	
*	Ireland, John				232 POLK DR	ARCOLA, IL	61910	
*	Lewellyn, Anita				236 POLK DR	ARCOLA, IL	61910	
*	Condarco, Terri				240 POLK DR	ARCOLA, IL	61910	
*	Arguelles, Jorge				244 POLK DR	ARCOLA, IL	61910	
*	Bowman, Lee				248 POLK DR	ARCOLA, IL	61910	
*	Burke, Clinton				252 POLK DR	ARCOLA, IL	61910	
*	Cantu, Angela				256 POLK DR	ARCOLA, IL	61910	
*	Leach, Linda				260 POLK DR	ARCOLA, IL	61910	
*	Boyd/439 Elm Street Llc				439 N. ELM ST	ARCOLA, IL	61910	
*	Beachy, Myra S.				435 N. ELM ST	ARCOLA, IL	61910	
*	Spear, Bob				429 N. ELM ST	ARCOLA, IL	61910	
*	Brown, Rusty				421 N. ELM ST	ARCOLA, IL	61910	
*	Gee, Janice				425 N. ELM ST	ARCOLA, IL	61910	
*	Joergens, Byron				253 POLK DR	ARCOLA, IL	61910	
*	Lebeter, Brad				273 CIRCLE DR	ARCOLA, IL	61910	
*	Lebeter, Brian				269 CIRCLE DR	ARCOLA, IL	61910	
*	Kutz, Karla & Justin				265 CIRCLE DR	ARCOLA, IL	61910	
*	Resident				261 CIRCLE DR	ARCOLA, IL	61910	
*	Eickberg, James				257 CIRCLE DR	ARCOLA, IL	61910	
*	Nall, Shannon				253 CIRCLE DR	ARCOLA, IL	61910	
*	Adams, April & Rodney				249 CIRCLE DR	ARCOLA, IL	61910	
*	Gillenwater, Sasha				245 CIRCLE DR	ARCOLA, IL	61910	
*	Joergens, Steve				235 CIRCLE DR	ARCOLA, IL	61910	
*	Plank, Merle				237 CIRCLE DR	ARCOLA, IL	61910	
*	Fiala, Rick				239 CIRCLE DR	ARCOLA, IL	61910	
*	Gibson, Shay				229 CIRCLE DR	ARCOLA, IL	61910	
*	Leal, Epigmenio				225 CIRCLE DR	ARCOLA, IL	61910	
*	Ade, Amie				221 CIRCLE DR	ARCOLA, IL	61910	
*	Horenkamp, Kenneth				217 CIRCLE DR	ARCOLA, IL	61910	
*	Jumper, Cindy				213 CIRCLE DR	ARCOLA, IL	61910	
*	Wilson, David & Amy				209 CIRCLE DR	ARCOLA, IL	61910	
*	Cain, Wilma				205 CIRCLE DR	ARCOLA, IL	61910	
*	Williams, Telva				201 CIRCLE DR	ARCOLA, IL	61910	
*	Rich, Debra J				208 CIRCLE DR	ARCOLA, IL	61910	
*	Gomez, Mike				212 CIRCLE DR	ARCOLA, IL	61910	
*	Resident				216 CIRCLE DR	ARCOLA, IL	61910	
*	Tomlin, Jean				224 CIRCLE DR	ARCOLA, IL	61910	
*	Resident				226 CIRCLE DR	ARCOLA, IL	61910	
*	Housley, Richard J.				228 CIRCLE DR	ARCOLA, IL	61910	
*	Gates, Steve				232 CIRCLE DR	ARCOLA, IL	61910	
*	Gobert, Heather				260 CIRCLE DR	ARCOLA, IL	61910	
*	Hackler, Rick				264 CIRCLE DR	ARCOLA, IL	61910	
*	Croslow, Theresa				272 CIRCLE DR	ARCOLA, IL	61910	
*	Garza, Jose J.				249 POLK DR	ARCOLA, IL	61910	
*	Scott, Elise				245 TAFT DR	ARCOLA, IL	61910	
*	Melton, Dennis				229 POLK DR	ARCOLA, IL	61910	

EA STAKEHOLDER LIST
Libman Company Wind Energy Project
Arcola, IL (Douglas County)

*	Garcia, Valente				225 POLK DR	ARCOLA, IL	61910	
*	Gudenrath, Earl				221 POLK DR	ARCOLA, IL	61910	
*	King, Carla				217 POLK DR	ARCOLA, IL	61910	
*	Silguero, Vicente				604 POPLAR PL	ARCOLA, IL	61910	
*	Blanchard, Toney A.				610 POPLAR PL	ARCOLA, IL	61910	
*	Tefft, Harold				218 TAFT DR	ARCOLA, IL	61910	
*	Conner, Jack				226 TAFT DR	ARCOLA, IL	61910	
*	Valdez, Graciela				230 TAFT DR	ARCOLA, IL	61910	
*	Torres, Edgar Hernan				234 TAFT DR	ARCOLA, IL	61910	
*	Arguelles, Jaime				241 TAFT DR	ARCOLA, IL	61910	
*	Slaughter, James V.				237 TAFT DR	ARCOLA, IL	61910	
*	Gonzalez, Jesus				233 TAFT DR	ARCOLA, IL	61910	
*	Nale, Terry				229 TAFT DR	ARCOLA, IL	61910	
*	Kester, Pattie				225 TAFT DR	ARCOLA, IL	61910	
*	Jones, Samantha				221 TAFT DR	ARCOLA, IL	61910	
*	Stark, Wilford				217 TAFT DR	ARCOLA, IL	61910	
*	Mendoza, Daniel				616 POPLAR PL	ARCOLA, IL	61910	
*	Embry, Anna				620 POPLAR PL	ARCOLA, IL	61910	
*	Aspengren, Dorothy				220 TYLER DR	ARCOLA, IL	61910	
*	Edwards, C King & Erma				224 TYLER DR	ARCOLA, IL	61910	
*	Gates, Cecil				228 TYLER DR	ARCOLA, IL	61910	
*	Taylor, Shirley				232 TYLER DR	ARCOLA, IL	61910	
*	Rickfelder, Kara M				240 TYLER DR	ARCOLA, IL	61910	
*	Rosas, Aida				244 TYLER DR	ARCOLA, IL	61910	
*	Towle, Charles				241 TYLER DR	ARCOLA, IL	61910	
*	Rodriguez, Ruben				237 TYLER DR	ARCOLA, IL	61910	
*	Herrera, Fabian				233 TYLER DR	ARCOLA, IL	61910	
*	Livingston, Jerry				229 TYLER DR	ARCOLA, IL	61910	
*	Stovall, Larry				225 TYLER DR	ARCOLA, IL	61910	
*	Dowler, Charles				221 TYLER DR	ARCOLA, IL	61910	
*	Monke, Kenny				217 TYLER DR	ARCOLA, IL	61910	
*	Campos Jr., Fernando J.				630 POPLAR PL	ARCOLA, IL	61910	
*	Edwards, Richard A.				637 POPLAR PL	ARCOLA, IL	61910	
*	Mulrooney, M. A.				633 POPLAR PL	ARCOLA, IL	61910	
*	Resident				629 POPLAR PL	ARCOLA, IL	61910	
*	Gullion, Danny				627 POPLAR PL	ARCOLA, IL	61910	
*	Reece, Kathy				617 POPLAR PL	ARCOLA, IL	61910	
*	Gonzalez, Jose A.				613 POPLAR PL	ARCOLA, IL	61910	
*	Leal, Manuela				609 POPLAR PL	ARCOLA, IL	61910	
*	Rippey, Paul A.				605 POPLAR PL	ARCOLA, IL	61910	
*	McNary, Shirley				203 POLK PL	ARCOLA, IL	61910	
*	Resident				607 N. LOCUST ST	ARCOLA, IL	61910	
*	Resident				609 N. LOCUST ST	ARCOLA, IL	61910	
*	Fulton, Bailey				617 N. LOCUST ST	ARCOLA, IL	61910	
*	GOOD, CHRIS				623 N. LOCUST ST	ARCOLA, IL	61910	
*	Morales, Maria				633 N. LOCUST ST	ARCOLA, IL	61910	
*	Ingram, Duane				639 N. LOCUST ST	ARCOLA, IL	61910	
*	Philippi, Gary				701 N. LOCUST ST	ARCOLA, IL	61910	
*	Knaus, Terry				707 N. LOCUST ST	ARCOLA, IL	61910	
*	Moody, Dorothy				711 N. LOCUST ST	ARCOLA, IL	61910	
*	Lathrop, Scott				715 N. LOCUST ST	ARCOLA, IL	61910	
*	Doemelt, Liberty K				719 N. LOCUST ST	ARCOLA, IL	61910	
*	Doemelt, Clay				777 N. LOCUST ST	ARCOLA, IL	61910	
*	Hatteberg, Fleurette				801 N. LOCUST ST	ARCOLA, IL	61910	
*	Turner, Louis				901 E. CR 300N	ARCOLA, IL	61910	
*	Garza, Raymundo				805 N. LOCUST ST	ARCOLA, IL	61910	
*	Gordon, Estate Of Bert				716 N. LOCUST	ARCOLA, IL	61910	
*	Marlow, Tom and Bernice				528 N. LOCUST ST	ARCOLA, IL	61910	
*	Garcia, Aldo & Blanca				510 N. LOCUST ST	ARCOLA, IL	61910	
*	Cherry, Terri				506 N. LOCUST ST	ARCOLA, IL	61910	

EA STAKEHOLDER LIST
Libman Company Wind Energy Project
Arcola, IL (Douglas County)

*	Ruiz, Lorenso				410 N. LOCUST ST	ARCOLA, IL	61910	
*	Zendeja, Arturo L.				404 N. LOCUST ST	ARCOLA, IL	61910	
*	Glende, Suzanne				629 POPLAR PLACE	ARCOLA, IL	61910	
*	Carreon, Gabriela				224 TAFT DR	ARCOLA, IL	61910	
*	Dela Garza, Jesus A				226 CIRCLE DRIVE	ARCOLA, IL	61910	
*	Logan, Kenny				400 N. LOCUST ST	ARCOLA, IL	61910	
*	Adams, Arley Clifford				636 POPLAR PL	ARCOLA, IL	61910	
*	Cavazos, Rogelio				236 TYLER DR	ARCOLA, IL	61910	
*	Bushu, Larry				606 DOGWOOD DR	ARCOLA, IL	61910	
*	Lawrence, Raymond				102 REDBUD CT.	ARCOLA, IL	61910	
*	Boyer, Rosemary				108 REDBUD CT.	ARCOLA, IL	61910	
*	Love, Kenneth				110 REDBUD CT.	ARCOLA, IL	61910	
*	Thompson, Mrs. Lowell				616 DOGWOOD DR	ARCOLA, IL	61910	
*	Biggs, Albert				650 DOGWOOD DR	ARCOLA, IL	61910	
*	Moore, Jeff				656 DOGWOOD DR	ARCOLA, IL	61910	
*	Baker, Bruce				116 REDBUD CT	ARCOLA, IL	61910	
*	Bennett, Sharon				603 DOGWOOD DR	ARCOLA, IL	61910	
*	Gillenwater, Lucille				605 DOGWOOD DR	ARCOLA, IL	61910	
*	Pryor, David				611 DOGWOOD DR	ARCOLA, IL	61910	
*	Medina, Sergio				609 DOGWOOD DR	ARCOLA, IL	61910	
*	Dowell, Delbert				607 DOGWOOD DR	ARCOLA, IL	61910	
*	Vyverberg, Ron				613 DOGWOOD DR	ARCOLA, IL	61910	
*	Guyot, John				617 DOGWOOD DR	ARCOLA, IL	61910	
*	Kalaskie, Raymond				103 HAWTHORNE CT	ARCOLA, IL	61910	
*	Hart, Loretta				107 HAWTHORNE CT	ARCOLA, IL	61910	
*	Van Gundy, Kim				111 HAWTHORNE CT	ARCOLA, IL	61910	
*	Dunagan, Debbie				115 HAWTHORNE CT	ARCOLA, IL	61910	
*	Robinson, Mike				119 HAWTHORNE CT	ARCOLA, IL	61910	
*	Hudson, Robert G.				691 DOGWOOD DR	ARCOLA, IL	61910	
*	Noyes, Dale				695 DOGWOOD DR	ARCOLA, IL	61910	
*	Johns, Jeff				699 DOGWOOD DR	ARCOLA, IL	61910	
*	Coombe, Emily				703 DOGWOOD DR	ARCOLA, IL	61910	
*	Hawkins, Pat				735 DOGWOOD DR	ARCOLA, IL	61910	
*	Chrostoski, Jean				803 DOGWOOD DR	ARCOLA, IL	61910	
*	Resident				807 DOGWOOD DR	ARCOLA, IL	61910	
*	Bumgarner, William				815 DOGWOOD DR	ARCOLA, IL	61910	
*	Leman, Sheri				825 DOGWOOD DR	ARCOLA, IL	61910	
*	Pugh, David W.				835 DOGWOOD DR	ARCOLA, IL	61910	
*	Neighbor				845 DOGWOOD DR	ARCOLA, IL	61910	
*	Taylor, Melinda K				855 DOGWOOD DR	ARCOLA, IL	61910	
*	Gladish, Edward L.				844 DOGWOOD DR	ARCOLA, IL	61910	
*	Neighbor				790 DOGWOOD DR	ARCOLA, IL	61910	
*	Durdel, Jesse & Wendy				832 DOGWOOD DR	ARCOLA, IL	61910	
*	Cherry, Tim & Luellyn				770 DOGWOOD DR	ARCOLA, IL	61910	
*	Ruiz, Felipa				754 DOGWOOD DR	ARCOLA, IL	61910	
*	Harshbarger, Paul				744 DOGWOOD DR	ARCOLA, IL	61910	
*	Quivey, Mildred				740 DOGWOOD DR	ARCOLA, IL	61910	
*	Slack, Chris				736 DOGWOOD DR	ARCOLA, IL	61910	
*	Goben, Millard				728 DOGWOOD DR	ARCOLA, IL	61910	
*	Retz, Jason & Ashley				720 DOGWOOD DR	ARCOLA, IL	61910	
*	Shields, Ted				704 DOGWOOD DR	ARCOLA, IL	61910	
*	Lyons, Michael J.				725 DOGWOOD DR	ARCOLA, IL	61910	
*	Robey, Michael, W				614 DOGWOOD DR	ARCOLA, IL	61910	
*	McConkey, Holden C				764 DOGWOOD DR	ARCOLA, IL	61910	
*	Shonkwiler Residence				311 N CR 900E	ARCOLA, IL	61910	
*	Walters, Ben & Julie				951 E CR 300 N	ARCOLA, IL	61910	
*	Butler, Stephanie & Jeff				949 E CR 300 N	ARCOLA, IL	61910	

* = Provided copy of EA Notice of Availability

Department of Energy
Washington, DC 20585

July 16th, 2010

TO: Distribution List

SUBJECT: Notice of Scoping – Libman Company Wind Turbine Project, Arcola, Illinois (Douglas County)

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 Libman Company Wind Turbine Project. The Libman Company is proposing to install a single 1.5 megawatt (MW) wind turbine along with an associated gravel access road and underground electrical transmission equipment to the existing interconnection switchgear, on Libman Company property located North of their manufacturing facility in Arcola, IL (GPS: *Lat.* 39.691366, *Long.* -88.297656). The proposed wind energy project would provide electricity to the Libman manufacturing plant to reduce the commercial electrical needs of the facility and to lower the carbon footprint associated with products made at the plant. The Libman Company anticipates replacing up to 30 percent of its electric usage with renewable energy generated onsite. The proposed turbine location is an actively cultivated agricultural field. The average elevation of the turbine site is approximately 664 feet. A Vensys 77m rotor turbine on 85m tower has been selected (approximately 415 feet above ground level). 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 ***July 30th, 2010*** *to:*

John Jediny
NEPA Document Manager
Department of Energy
Energy Efficiency and Renewable Energy
(OIBMS-EE-3) Rm. 5H-095
1000 Independence Avenue
Washington, DC, 20585
John.Jediny@ee.doe.gov

We look forward to hearing from you.

Sincerely,

John Jediny
NEPA Document Manager

FIGURE 1

Aerial image of Libman facilities with approximate turbine location indicated

Figure 2
Aerial Image with Proposed Wind Turbine Location

LEGEND

	PROPERTY / TITLE / R.O.W. LINE
	FENCE
	LAKE, POND, RIVER
	DRAINAGE, WETLAND
	ELECTRIC, OVERHEAD, W/ POWER POLE
	GAS LINE, UNDERGROUND
	SANITARY SEWER
	STORM SEWER OR DRAIN
	FIBER OPTIC, UNDERGROUND
	INDEX CONTOUR
	INTERMEDIATE CONTOUR
	STRUCTURE
	PROPOSED WIND TURBINE GENERATOR

NORTH

[illegible]

SOURCE OF BASE MAP

1. TOPOGRAPHIC DATA, SITE FEATURES AND PROPERTY LINES [illegible]
2. AERIAL PHOTO [illegible]
3. [illegible]
4. CURRENT CONDITIONS MAY VARY FROM THOSE SHOWN ON THE BASE MAP. [illegible]

CONSTRUCTION COORDINATES

[illegible]	[illegible]		[illegible]	
	LATITUDE	LONGITUDE	NORTHING	EASTING
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

LIBMAN

LOCATOR PLAN
(WITH ORTHOPHOTO)

THE LIBMAN COMPANY
WIND ENERGY PROJECT
ARCOLA, ILLINOIS

NO.	DATE	REVISION
[illegible]	[illegible]	[illegible]

SHEET 1

[illegible]

Attachment D-12
IHPA List of Historic Illinois Tribes

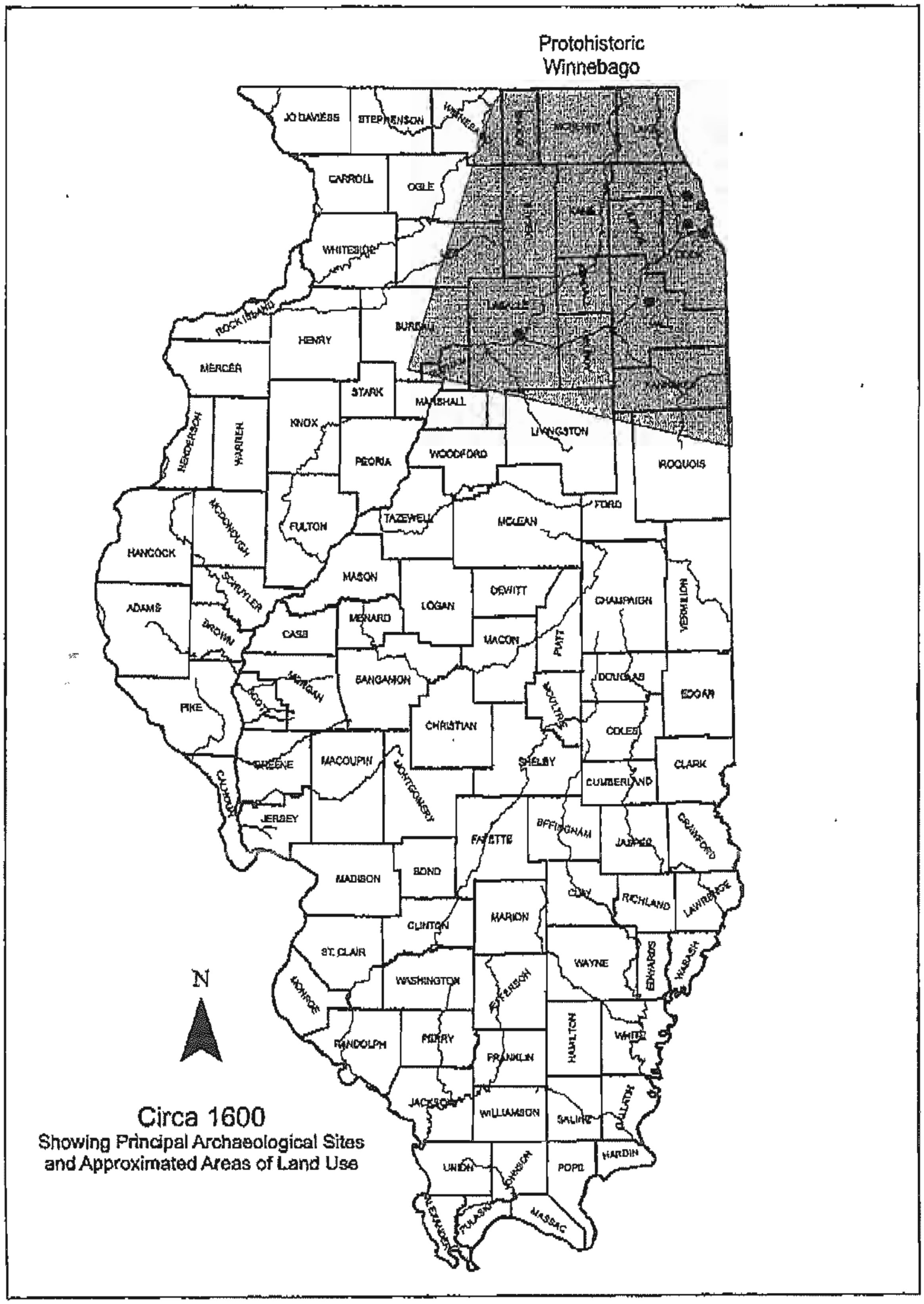
Illinois Tribal Consultation Workshop Tribe Contact List

Tribe (in alphabetical order)	Main workshop contact identified	Tribe Attended Nov 5th-6th Workshop
Absentee Shawnee Nation of Oklahoma	Karen Kaniatobe, NAGPRA Rep 2025 Gordon Cooper Drive Shawnee, Oklahoma 74801 main office: (405) 275-4030 x 199 fax: (405) 878-4533 email: kkaniatobe@astribe.com	No
Ho Chunk Nation of Wisconsin	Bill Quackenbush, THPO W9815 Airport Road Black River Fall, WI 54615 (715) 284-7181 Bill.Quackenbush@ho-chunk.com	Yes
Iowa Tribe of Kansas and Nebraska	Pat Murphy American Indian Art Center 206 S. Buckeye Abilene, KS 67410 (785) 263-0090 indart@ikansas.com	Yes
Kaw Nation	Crystal Douglas (580) 269-2552 cdouglas@kawnation.com Ray Ball (580) 269-2552 rball@kawnation.com	Yes
Kickapoo Tribe of Kansas	Joe Williams, NAGPRA Rep 1107 Goldfinch Road Horton, KS 66439 (785) 486-2601 x 2110 Joe.Willaims@ktik-nsn.gov	Yes

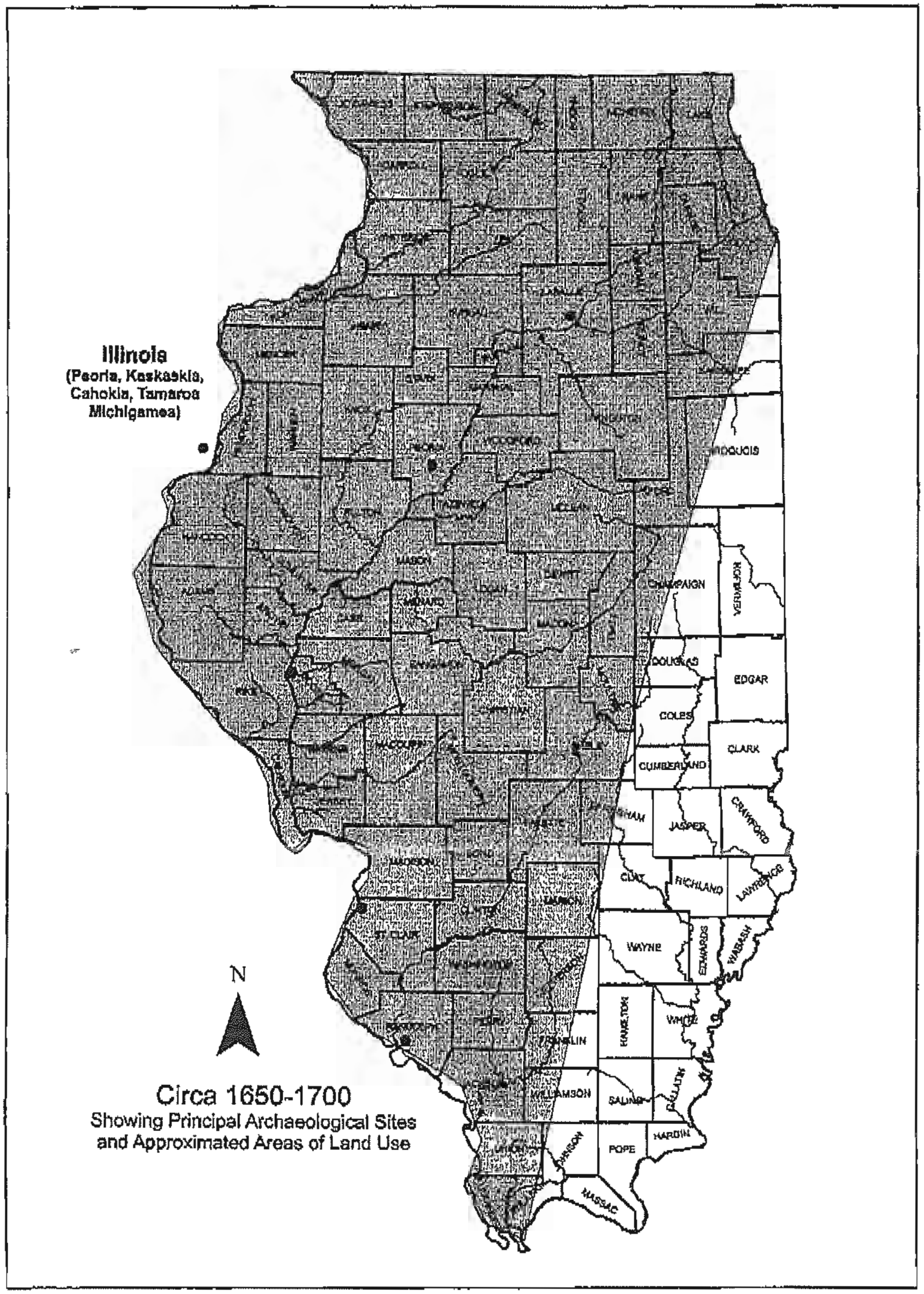
Kickapoo Tribe of OK	Kent Collier P.O. Box 70 McCloud, OK 74851 (405) 964-2075 kentcollier2000@yahoo.com	No
Omaha Tribe NE	Tony Provost omaharedman@yahoo.com 402-846-5167	No
Osage	Dr. Andrea A. Hunter, THPO Osage Nation 627 Grandview P.O. Box 779 Pawhuska, OK 74056 ahunter@osagetribe.org	Yes
Peoria	Mr. John P. Froman, Chief Peoria Tribe of Indians of Oklahoma P.O. Box 1527 Miami, OK 74355 (918) 540-2535	No
Pokagon Band Of Potawatomi	Mark Parish, THPO 58620 Sink Road Dowagiac, MI 49047 (269) 782-9602	No
Ponca Tribe Nebraska	Larry Wright ldwrightjr@gmail.com 402-540-7122 Gary Robinette garyr@poncatribe-ne.org 402-857-3519 Rick Wright berrick@cableone.net 402-371-9577	Yes
Ponca Tribe OK	Delbert Cole wanxe_sabe@hotmail.com 580-762-5818	No

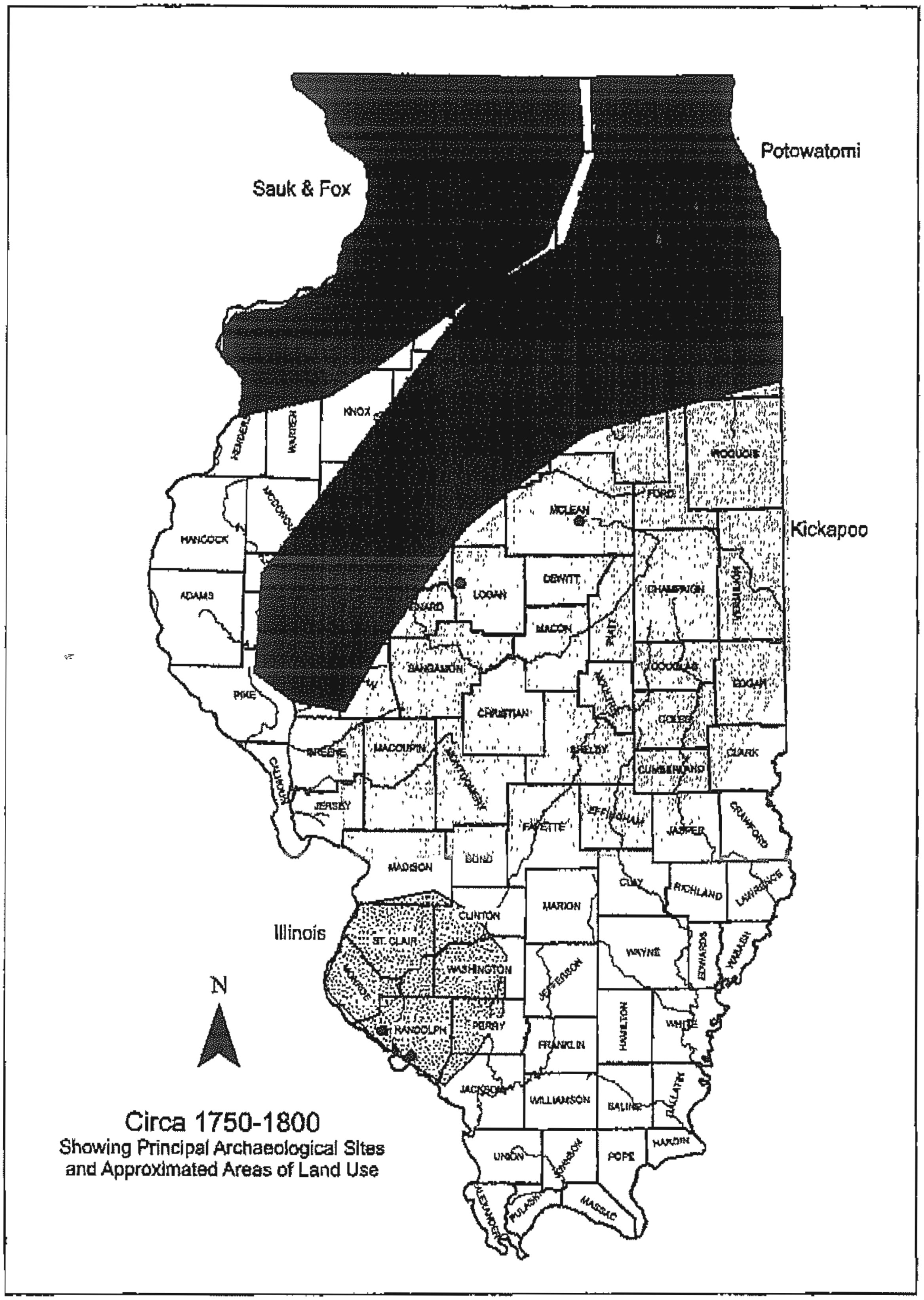
Potawatomi Hannahville Indian Community	Earl Meshiguad Hannahville Indian Community N14911 Hannahville Boulevard Road Wilson, MI 49896 (906)-723-2271 earlmeshiguad@hannahville.org	No
Potawatomi-Citizen Band	Jeremy Finch, THPO 1601 Gordon Copper Drive Shawnee, OK 74801 jfinch@potawatomi.org (405) 878-4672	No
Potawatomi-Prairie Band	Steve Ortiz (785) 966-4000 stevo@pbpnation.org	Yes
Potowatomi-Forest County Community	Mr. Philip Shopodock, Chairman Executive Council Forest County Potawatomi Community P. O. Box 340 Crandon, WI 54520 Mike Alloway (715) 478-7474	No
Quapaw	Mr. John Berrey, Chairman Quapaw Tribal Business Committee P.O. Box 765 Quapaw, OK 74363 (918) 542-1853 Fax: (918) 542-4694 john.berrey@qdsllc.com Aditional contact identified: Ardina Moore 918-397-5308 918-542-8870 ardina@sbcglobal.net	No

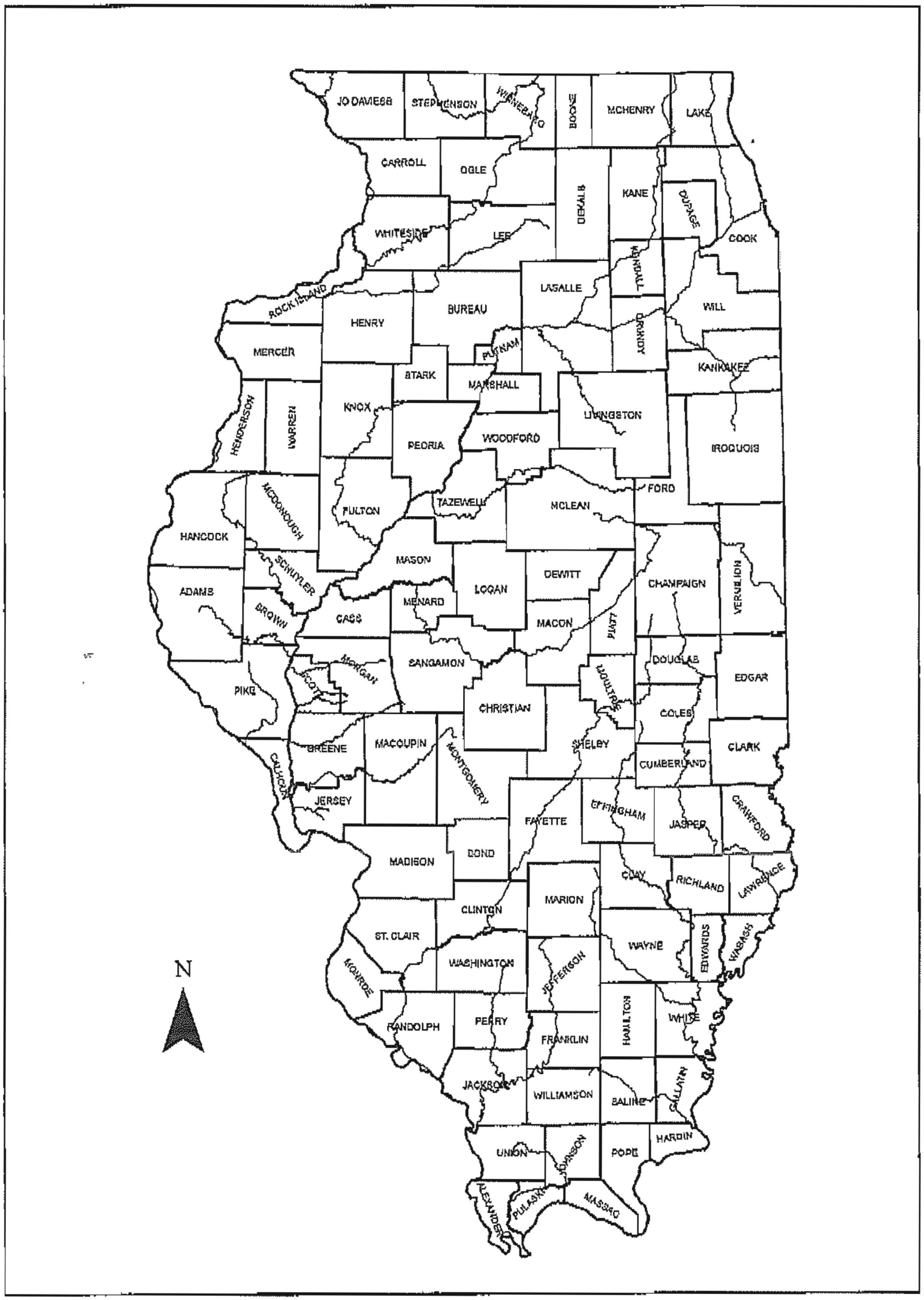
Sac and Fox Nation of Mississippi in IOWA	Mr. Jonathan Buffalo, NAGPRA Rep. Sac & Fox Tribe of Mississippi 349 Meskwaki Road Tama, IA 52339 (641) 484-4678 NEW NUMBER: (641) 484-3185 jbuffalo@meskwaki.org	No
Sac and Fox Nation of Missouri	Kirby Rubidoux, NAGPRA Rep 305 N Main Street Reserve, KS 66465 (785) 742-7471	No
Sac and Fox Nation of OK	Sandra Massey, NAGPRA Rep Route 2, Box 246 Stroud, OK 74079 (918) 968-3526 smassey@sacandfoxnation-nsn.gov	Yes
Winnebago Tribe of Nebraska	David Smith P.O. Box 687 Winnebago, NE 68071 (402) 878-2380 theking@huntel.net	No



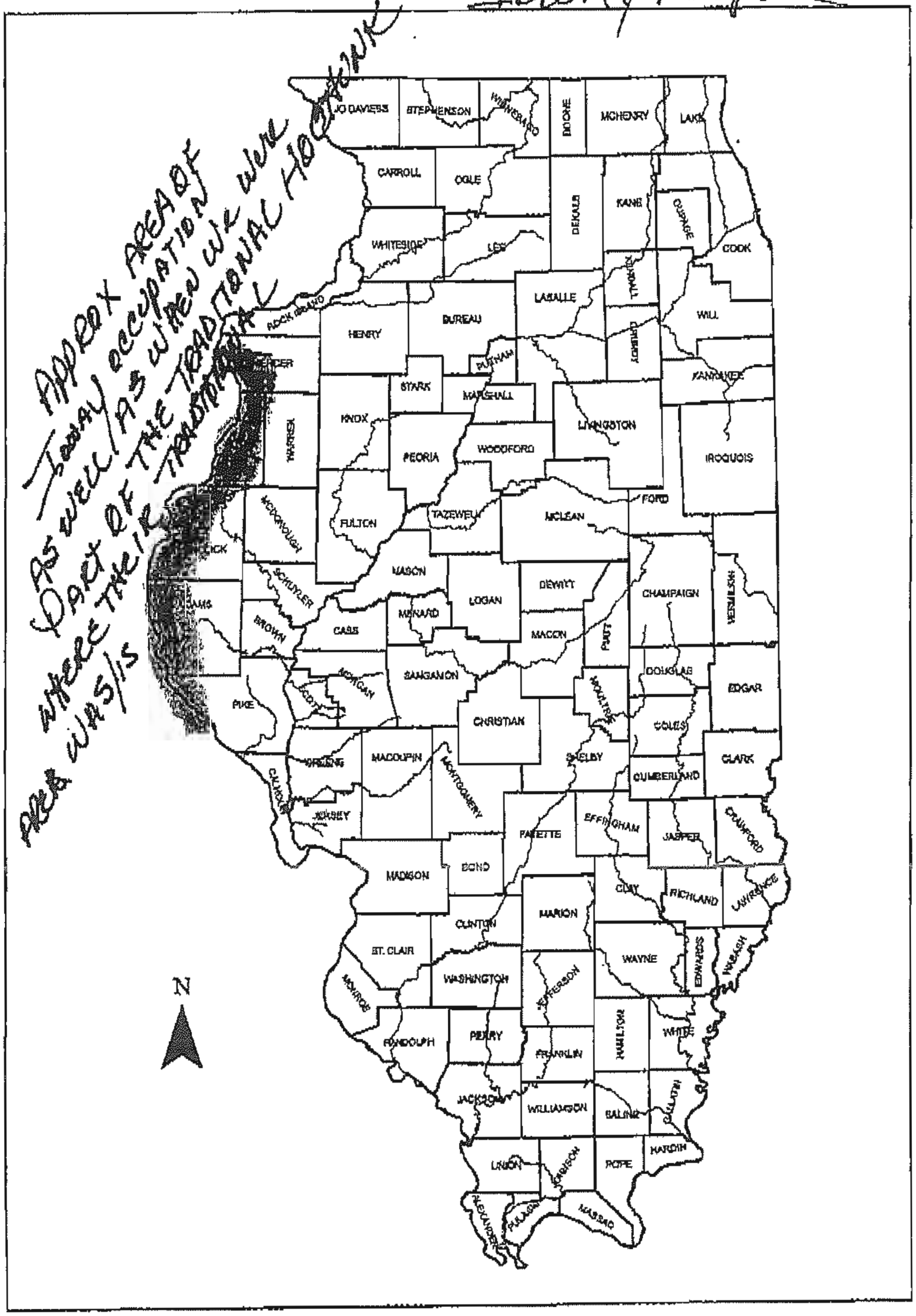
Circa 1600
Showing Principal Archaeological Sites
and Approximated Areas of Land Use


Illinois
(Peoria, Kaskaskia, Cahokia, Tamaroa Michigamea)
N
Circa 1650-1700
Showing Principal Archaeological Sites and Approximated Areas of Land Use
CHAMPAIGN
VERMILION
EDGAR
COLES
CLARK
CUMBERLAND
JASPER
CRAWFORD
RICHLAND
WAYNE
EDWARDS
WABASH
HAMILTON
WILLIAMSON
POPE
HARDIN
MASSAC

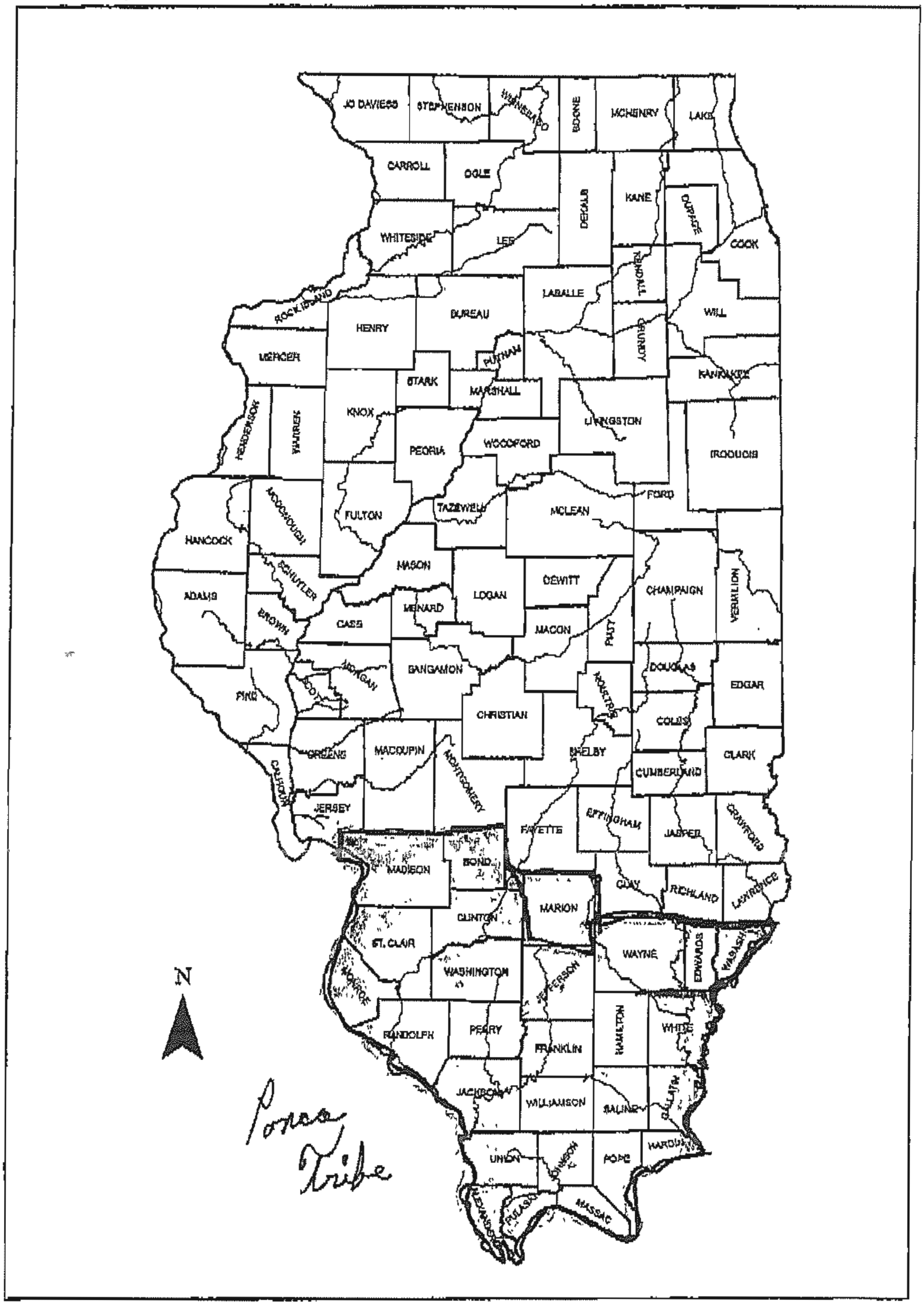

Potowatomi
Sauk & Fox
Kickapoo
Illinois
N
HANCOCK
ADAMS
PIKE
KNOX
WARREN
MCLEAN
LOGAN
DEWITT
MACON
CHAMPAIGN
VERMILION
IROQUOIS
FORD
SANGAMON
CHRISTIAN
DOUGLAS
EDGAR
COLES
CLARK
CUMBERLAND
SHELBY
GREENE
MACOUPIN
JERSEY
CALHOUN
MONTGOMERY
FAYETTE
EFFINGHAM
JASPER
CRAWFORD
MADISON
BOND
CLAY
RICHLAND
LAWRENCE
CLINTON
MARION
ST. CLAIR
WASHINGTON
MONROE
JEFFERSON
WAYNE
EDWARDS
WABASH
RANDOLPH
PERRY
FRANKLIN
HAMILTON
WHITE
JACKSON
WILLIAMSON
SALINE
GALLATIN
UNION
JOHNSON
POPE
HARDIN
ALEXANDER
PULASKI
MASSAC
Circa 1750-1800
Showing Principal Archaeological Sites
and Approximated Areas of Land Use


JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
CARROLL
OGLE
DEKALB
KANE
DUPAGE
COOK
WHITESIDE
LEE
KENDALL
ROCK ISLAND
LASALLE
WILL
HENRY
BUREAU
GRUNDY
MERCER
PUTNAM
STARK
MARSHALL
KANKAKEE
HENDERSON
WARREN
KNOX
LIVINGSTON
PEORIA
WOODFORD
IROQUOIS
FORD
MCDONOUGH
FULTON
TAZEWELL
MCLEAN
HANCOCK
SCHUYLER
MASON
DEWITT
ADAMS
BROWN
LOGAN
CHAMPAIGN
VERMILION
CASS
MENARD
MACON
PIATT
DOUGLAS
EDGAR
MORGAN
SCOTT
SANGAMON
PIKE
MOULTRIE
COLES
CHRISTIAN
SHELBY
CLARK
GREENE
MACOUPIN
MONTGOMERY
CUMBERLAND
CALHOUN
JERSEY
EFFINGHAM
JASPER
CRAWFORD
FAYETTE
MADISON
BOND
CLAY
RICHLAND
LAWRENCE
MARION
CLINTON
ST. CLAIR
WAYNE
EDWARDS
WABASH
WASHINGTON
JEFFERSON
MONROE
HAMILTON
WHITE
RANDOLPH
PERRY
FRANKLIN
JACKSON
WILLIAMSON
SALINE
GALLATIN
HARDIN
UNION
JOHNSON
POPE
ALEXANDER
PULASKI
MASSAC
N

IOWAY PEOPLE

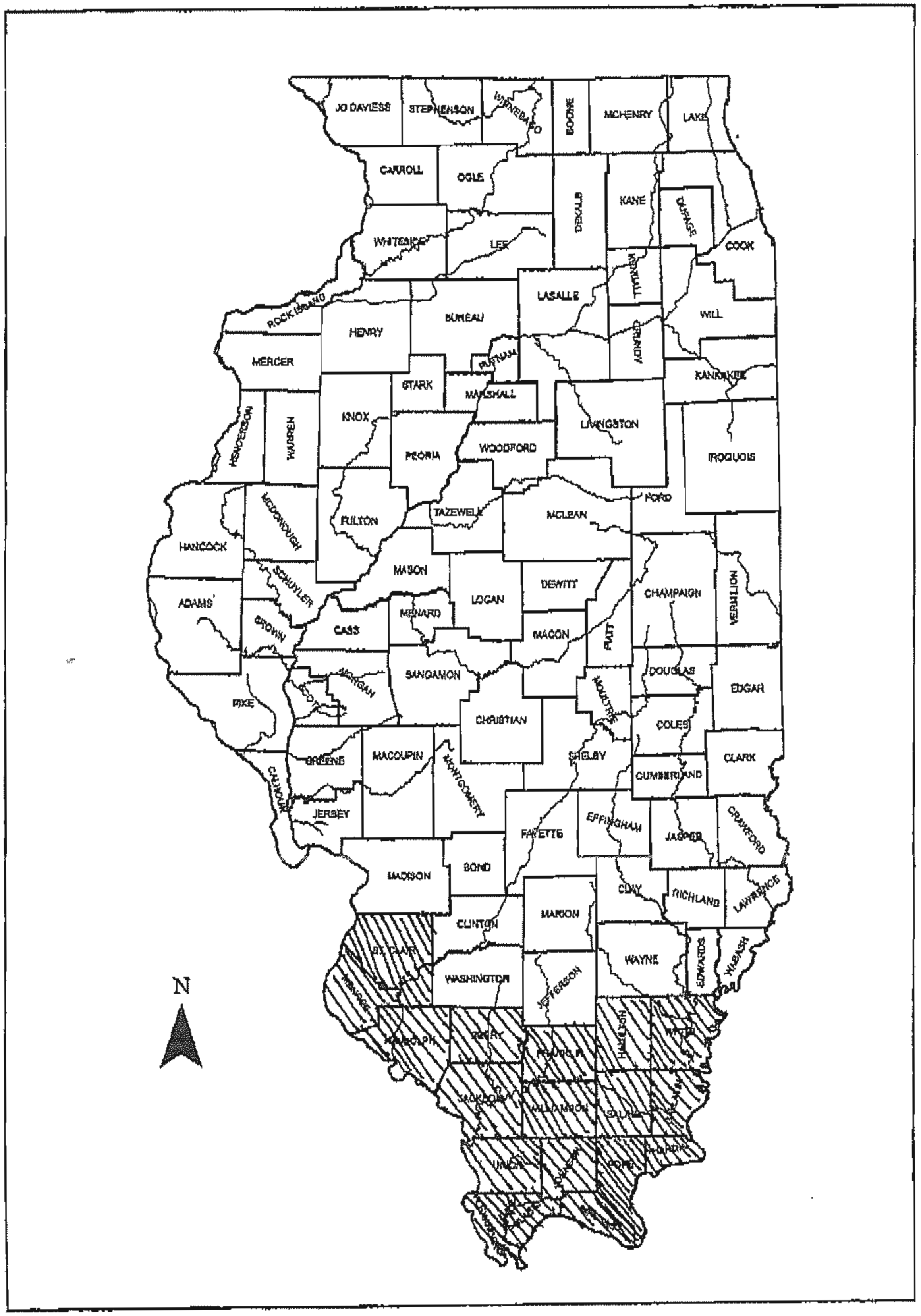


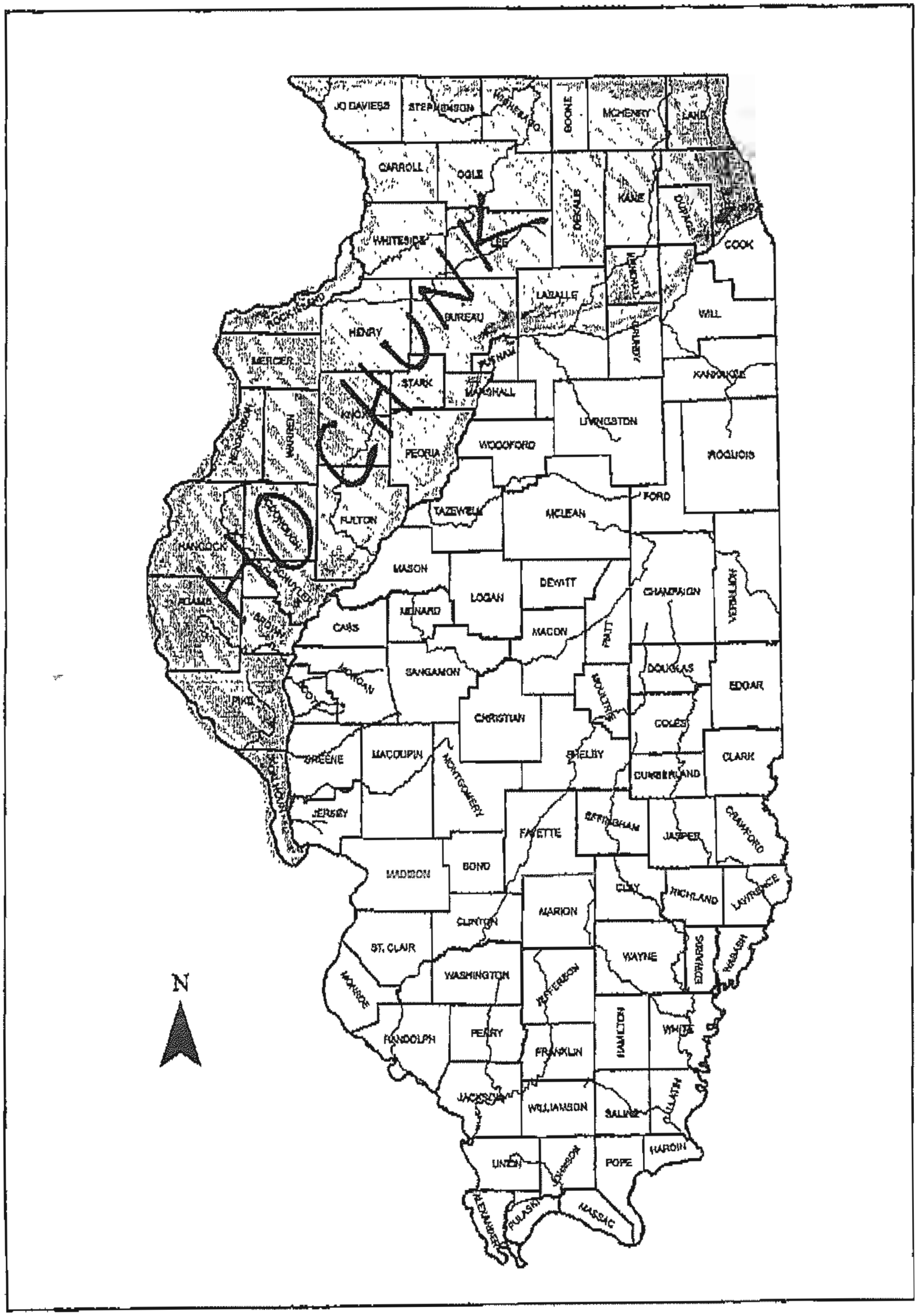
PONCA TRIBE OF NEBRASKA



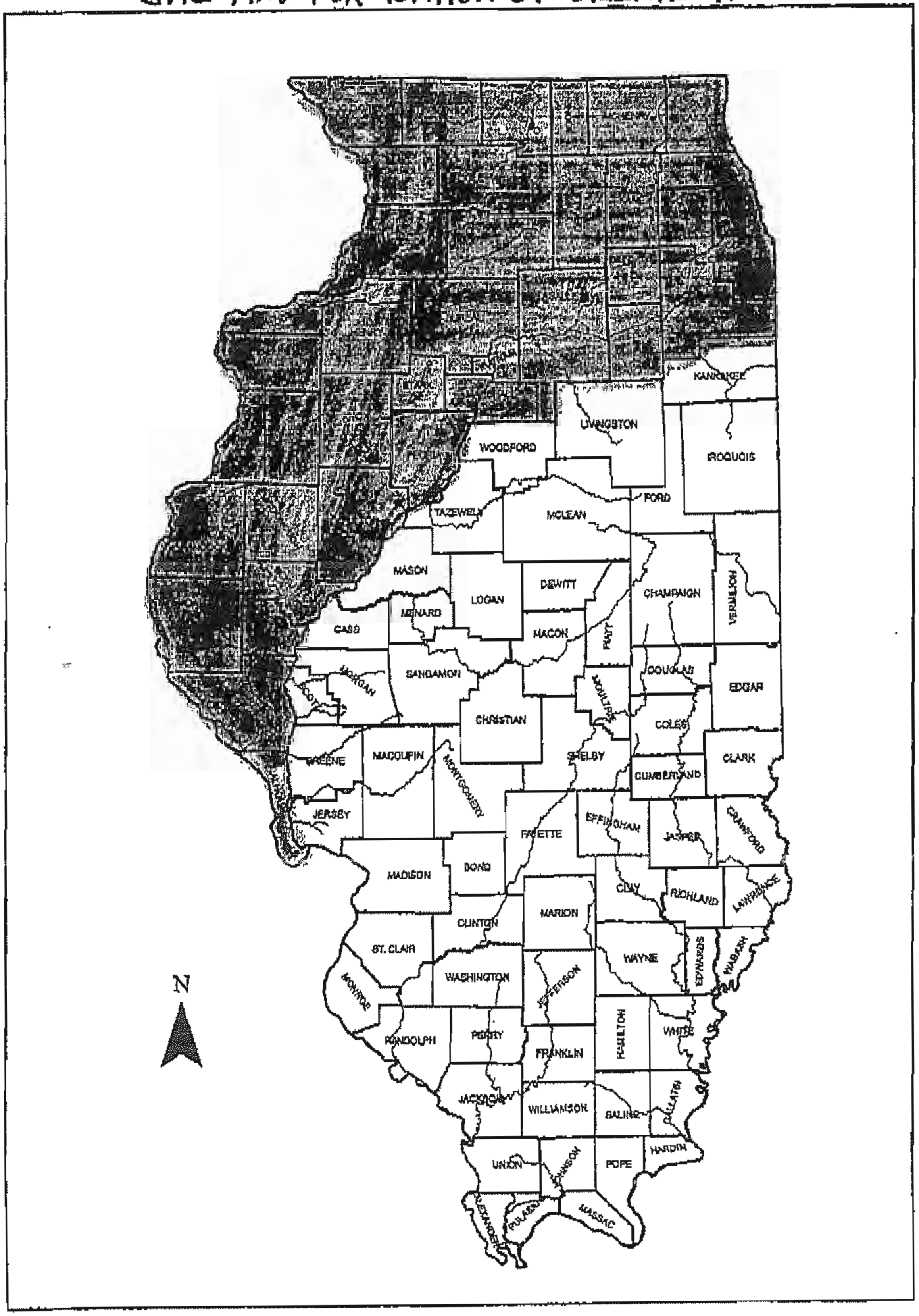
580 269-2552
1-866-404-5297
cdouglas@kawnation.com

KAW Nation
Crystal Douglas

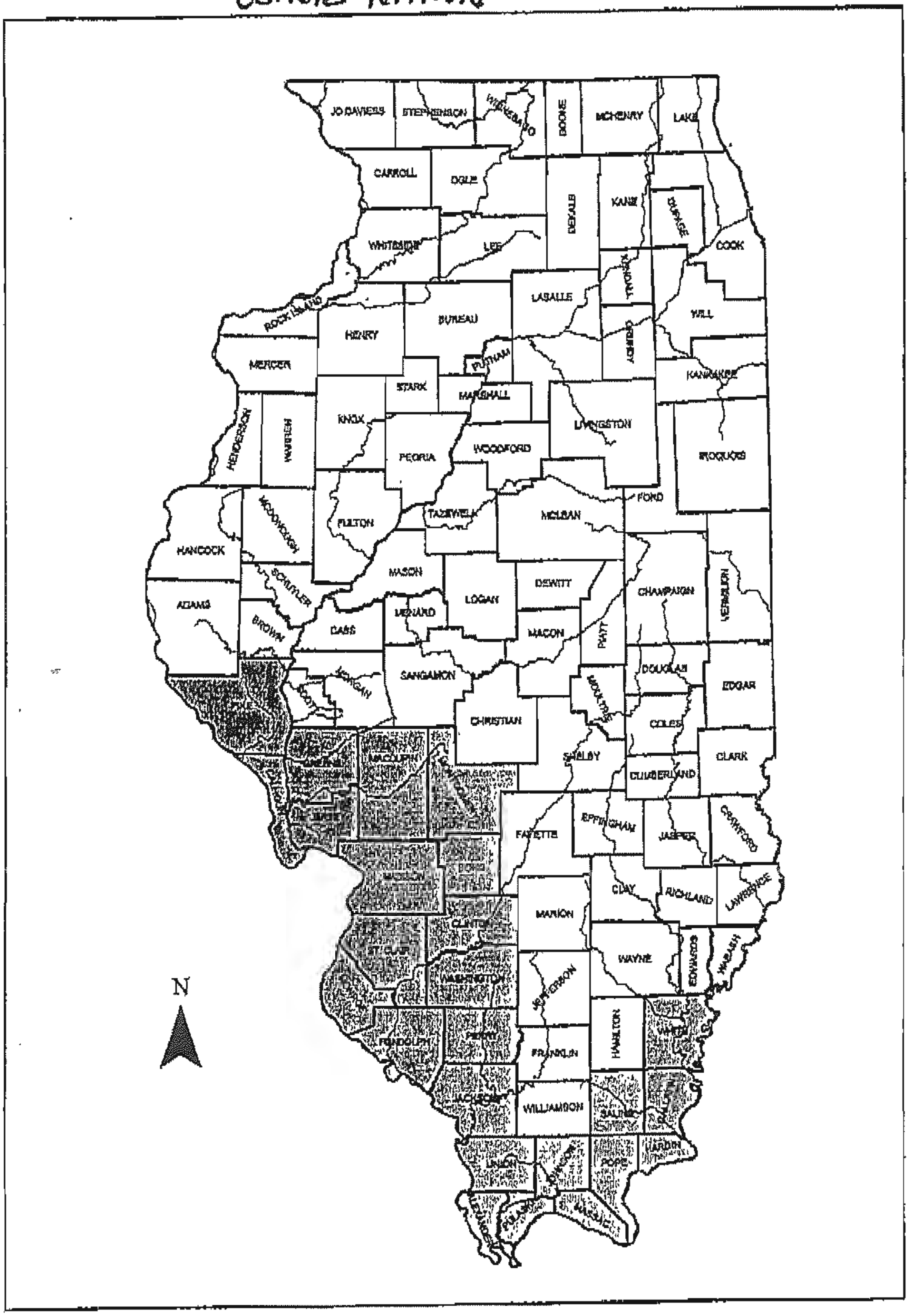



HO CHUNK
JO DAVIESS
BOONE
MCHENRY
LAKE
CARROLL
OGLE
DEKALB
KANE
WHITESIDE
LEE
COOK
LASALLE
BUREAU
HENRY
MERCER
WILL
KANKAKEE
STARK
MARSHALL
LIVINGSTON
WARREN
PEORIA
WOODFORD
FORD
FULTON
TAZEWELL
MCLEAN
HANCOCK
MASON
DEWITT
CHAMPAIGN
VERMILION
ADAMS
LOGAN
MENARD
CASS
MACON
PIATT
SANGAMON
DOUGLAS
EDGAR
CHRISTIAN
PIKE
COLES
GREENE
MACOUPIN
MONTGOMERY
SHELBY
CLARK
CUMBERLAND
JERSEY
FAYETTE
EFFINGHAM
JASPER
CRAWFORD
MADISON
BOND
CLAY
RICHLAND
LAWRENCE
MARION
CLINTON
ST. CLAIR
WAYNE
EDWARDS
WABASH
WASHINGTON
JEFFERSON
MONROE
RANDOLPH
PERRY
HAMILTON
WHITE
FRANKLIN
JACKSON
WILLIAMSON
SALINE
GALLATIN
UNION
JOHNSON
POPE
HARDIN
PULASKI
MASSAC
ALEXANDER
N

SAC AND FOX NATION OF OKLAHOMA



OSAGE NATION



Attachment D-13
Decommissioning Plan Summary

DECOMMISSIONING PLAN

FOR ARCOLA, ILLINOIS WIND ENERGY PROJECT OF

THE LIBMAN COMPANY

1. **Introduction and Project Description.**

The Arcola, Illinois Wind Energy Project proposed by The Libman Company, an Illinois corporation ("Libman") includes the construction, installation, operation and maintenance of a wind turbine and tower, associated collection lines and related improvements and facilities (collectively, the "Facilities") for the purposes of generating and using electricity produced by the Facilities (the "Project").

2. **Purpose.**

The purpose of this Decommissioning Plan is to identify the methodology that Libman will use to mitigate potential impacts resulting from the cessation of operations of the Facilities at the end of the Project's useful life. This Decommissioning Plan identifies the specific Facilities and Project components that will be removed from Libman's property under certain circumstances and the costs associated with the removal of such components.

3. **Decommissioning Process.**

Libman shall decommission its Facilities and the Project, at Libman's sole cost and expense, in either of the following instances (each being a "Triggering Event"):

a. The Facilities fail to be operated for a continuous period of twelve (12) months; or

b. Libman voluntarily elects to cease operations of its Facilities and to decommission its Facilities and Project prior to the expiration of the twelve (12) month period set forth in Section 3 (a) herein.

Decommissioning of the Facilities and the Project shall be completed pursuant to the procedures and plans set forth in the Decommissioning Report dated May 2010 and prepared by Fehr-Graham & Associates, LLC for its Project No. 10-390, a copy of which is attached hereto as **Exhibit A** and incorporated herein by this reference (the "Report").

4. **Financial Assurance.**

As security for Libman's obligations arising pursuant to this Decommissioning Plan, Libman shall, upon the expiration of the fifth (5^{th}) year after installation of the Facilities, establish a letter of credit in an amount equal to the total net costs (net of salvage value) of decommissioning of the Facilities and Project as set forth in the Report with a financial institution mutually acceptable to the City of Arcola, Illinois (the "Letter of Credit"). The terms and conditions of the Letter of Credit shall be mutually acceptable to both Libman and the City of Arcola, Illinois; provided, however, that the acceptance of such Letter of Credit shall not be unreasonably withheld, conditioned or delayed by either party.

5. **Binding Effect.**

The terms of this Decommissioning Plan shall be binding upon the owner and operator of the Project, from time to time, including Libman and its successors and assigns.

6. **Access to Project**.

At any point after a Triggering Event occurs, the City of Arcola, Illinois shall have access to Libman's property on which its Facilities exist for the sole purpose of confirming the status and completion of the decommissioning of the Facilities and Project; provided, however, that any officer, employee, representative or agent of the City of Arcola, Illinois shall provide Libman with written notice at least forty-eight (48) hours in advance of accessing the applicable property prior to accessing such property for any purpose.

IN WITNESS WHEREOF, The Libman Company, an Illinois corporation, hereby enacts and makes this Decommissioning Plan effective as of the _____ day of ___________________, 2010.

The Libman Company, an Illinois corporation

By: ___________________________________

Its: ___________________________________

Attachment D-14
Arcola City Council Meeting Minutes August 2, 2010

REGULAR ARCOLA CITY COUNCIL MEETING
MONDAY, AUGUST 2, 2010
7:00 p.m.

AGENDA

- Roll Call
- Pledge of Allegiance
- Public Comment

OLD BUSINESS

- Approval of July 19, 2010 Council Meeting Minutes
- Approval of July 17 – July 30, 2010 Bills
- Approval of the Treasurer's Report for July
- Approval of the July Zoning Officer's Report

NEW BUSINESS

- Report from the TIF Advisory Committee
- Consider and Approve Reinstating the TIF Storefront Grant Program
- Consider Scheduling a Public Hearing for the Libman Turbine Proposal

COMMITTEE REPORTS

- Foran
- Goad
- Williams
- Moore
- Key
- Gentry

COMMITTEE MEETINGS:

MINUTES OF THE REGULAR ARCOLA CITY COUNCIL MEETING
Monday August 02, 2010

Mayor Ferguson called the meeting to order at 7:00 p.m. Members present were Alderpersons Foran, Goad, Williams, Moore and Gentry. Alderwoman Key was not present. City Administrator Wagoner, Treasurer Harvey and Attorney Bequette were also present.

PLEDGE OF ALLEGIANCE Alderman Foran led the Council and audience in the Pledge of Allegiance.

PUBLIC COMMENT Beverly and David Pryor, Delbert, Dowell, Jane Jenkins, Dawn Miller, Larry Stovall, Shirley Taylor, Myron Shonkwiler, Ed Gladish, Doug Dunagan, Lee Bumgarner, Pat Hawkins and John Guyot all spoke regarding Libman's proposed wind turbine. Beverly Pryor read two letters. One from David Pryor and one from Emily Coombe. The concerns of everyone who spoke and the letters are mainly the proposed location of wind turbine. They all feel it needs to be further from the community. They all commented that they are not against Libman's installing the turbine but are concerned about some of the possible problems caused by one. These being noise, shadowing and vibrations. They are also concerned about the value of their homes decreasing because of these problems. Doug Dunagan questioned whether there will be any problems with cellular or Wi-Fi reception. David and Beverly Pryor feel the wind turbine ordinance is flawed. The group questioned whether a permit had already been issued to Libman's. Attorney Bequette told them several permits are required from several agencies and we have not issued one. CA Wagoner commented that we are not relying on information from Libman's engineers only. Mayor Ferguson also told them we are using our own engineers to obtain information.

APPROVAL OF JULY 19, 2010 COUNCIL MEETING MINUTES Alderman Goad moved to approve the July 19, 2010 council meeting minutes as presented and was seconded by Alderman Foran. Roll call vote, Foran, ayes; Goad, ayes; Williams, abstain; Moore, aye and Gentry, aye. Motion carried.

APPROVAL OF JULY 17 – JULY 30, 2010 BILLS Alderwoman Moore moved to approve the July 17 – July 30, 2010 bills as presented and was seconded by Alderman Goad. Roll call vote, all ayes. Motion carried.

APPROVAL OF THE TREASURER'S REPORT FOR JULY Alderman Foran moved to approve the Treasurer's report for July and was seconded by Alderwoman Moore. Roll call vote, all ayes. Motion carried.

APPROVAL OF THE JULY ZONING OFFICER'S REPORT The Zoning Officer reported 3 permits issued in the month of July with valuation of $36,750.00 and $60 in fees collected. Alderman Goad moved to approve the July Zoning Officer's report and was seconded by Alderman Williams Roll call vote, all ayes. Motion carried.

REPORT FROM THE TIF ADVISORY COMMITTEE The TIF Advisory Committee met July 22, 2010 reviewed and recommended the Council approve the following requests.

1. Application from Ron Vyverberg of Vyverberg's for a 20% grant, up to $25,000 to reroof the 4 stores and for materials to paint front trim.

Alderwoman Moore moved to accept the recommendation of the TIF Advisory Committee and was seconded by Alderman Gentry. Roll call vote, all ayes. Motion carried.

2. Application from Ron Vyverberg of Vyverberg's for a Storefront Grant, 1 to 1 match up to $10,000 to reroof the 4 stores located at 119 E. Main.

Alderman Goad moved to table this motion until the consideration to reinstate the TIF Storefront Grant Program has been discussed. Alderman Gentry seconded the motion. Roll call vote, all ayes. Motion carried.

CONSIDER AND APPROVE REINSTATING THE TIF STOREFRONT GRANT PROGRAM Alderman Gentry moved to table this motion until a draft of the Storefront Grant was prepared. Alderwoman Moore seconded the motion. Roll call vote, all ayes. Motion carried.

Attorney Bequette informed the Council they could vote on the application from Vyverberg's for the Storefront Grant even though the motion to reinstate the TIF Storefront Grant Program was tabled.

Alderman Goad moved to accept the recommendation of the TIF Advisory Committee for the application from Vyverberg's for a Storefront Grant to reroof their building and was seconded by Alderman Gentry. Roll call vote, all ayes. Motion carried.

CONSIDER SCHEDULING A PUBLIC HEARING FOR THE LIBMAN TURBINE PROPOSAL Alderman Foran moved to schedule a Public Hearing for the Libman Turbine Proposal on August 19, 2010 at 6:00 p.m. at the Arcola Center. Alderwoman Moore seconded the motion. Roll call vote, all ayes. Motion carried.

COMMITTEE REPORTS

Alderman Foran Had nothing at this time.

Alderman Goad Had nothing at this time.

Alderman Williams Had nothing at this time.

Alderwoman Moore Had nothing at this time.

Alderman Gentry Had nothing at this time.

CA Wagoner reported that the Beautification Committee met and would like to ask everyone to not throw trash on boulevards and to pick up any you see.

Mayor Ferguson requested that people not throw gas clippings on streets that are curbed.

As this concluded the business of the meeting, Alderman Goad moved to adjourn and was seconded by Alderman Williams. Council approved unanimously by voice vote.

Adjourned at 8:07 p.m.

Larry Ferguson, Mayor
Carol Turner, City Clerk

Attachment D-15

Arcola Ordinance No. 10-S-11 Annexing Project Parcel into City of Arcola

REGULAR ARCOLA CITY COUNCIL MEETING
MONDAY, NOVEMBER 1, 2010
7:00 p.m.

AGENDA

- Roll Call
- Pledge of Allegiance
- Public Comment

OLD BUSINESS

- Approval of October 18, 2010 Council Meeting Minutes
- Approval of October 16 – October 29, 2010 Bills
- Approval of the Treasurer's Report for October
- Approval of the October Zoning Officer's Report

NEW BUSINESS

- Consider and Approve Resolution No. 10-R-11, A Resolution Concerning the Review and Release of Executive Session Minutes and the Destruction of Executive Session Audio Recordings
- Consider and Approve Ordinance No. 10-C-9, an Ordinance Amending Chapter 21 of the Arcola Municipal Code
- Consider and Adopt Tourism Committee Application and Funding Guidelines
- Consider and Approve Ordinance No. 10-S-11, Annexation of Libman Property to the City of Arcola
- Consider and Approve Ordinance No. 10-S-12, Annexation of Zachary Doemelt Property to the City of Arcola
- Consider and Approve Bid for Jacques Street Lift Station Pump Replacement

COMMITTEE REPORTS

- Foran
- Goad
- Williams
- Moore
- Key
- Gentry

COMMITTEE MEETINGS:

6:00 pm *Water & Sewer Committee*
6:30pm *Budget & Finance Committee*

PAMPHLET PUBLICATION

ORDINANCE NO. 10-S-11

AN ORDINANCE annexing 63.204 acres to the City of Arcola, Douglas County, Illinois, (Libman Equipment LLC Property described as Part of the NEW1/4 of Section 3 T14N, R8E of the 3rd PM, Douglas County, Illinois).

PRESENTED: November 1, 2010

PASSED: November 1, 2010

APPROVED: November 1, 2010

RECORDED:* November 2, 2010

PUBLISHED:* November 2, 2010

*Municipality's records.

The undersigned being the duly qualified and acting City Clerk of the City of Arcola, Illinois, does hereby certify that this document constitutes the publication in pamphlet form, in connection with and pursuant to Section 1-2-4 of the Illinois Municipal Code, of the above-captioned ordinance and that such ordinance was presented, passed, approved, recorded and published as above stated.

Carol Turner, City Clerk

(SEAL)

CITY OF ARCOLA. Corporate Seal DOUGLAS COUNTY, IL

ORDINANCE NO. 10-S-11

AN ORDINANCE annexing 63.204 acres to the City of Arcola, Douglas County, Illinois, (Libman Equipment LLC Property described as Part of the NEW1/4 of Section 3 T14N, R8E of the 3rd PM, Douglas County, Illinois).

* * *

WHEREAS, a written petition for annexation signed by the legal owners of record of all land within the territory hereinafter described has been filed with the City Clerk of the City of Arcola, Douglas County, Illinois, requesting that said territory be annexed to the City of Arcola; and

WHEREAS, at least 51% of the electors residing within the said territory joined in the said petition; and

WHEREAS, the said territory is not within the corporate limits of any municipality but is contiguous to the City of Arcola; and

WHEREAS, legal notices regarding the intention of the City of Arcola to annex said territory are not required to be sent to any fire protection district or public library district pursuant to the provisions of Section 7-1-1 of the Illinois Municipal Code, as amended, (65 ILCS 5/7-1-1); and

WHEREAS, it is in the best interests of the City of Arcola that said territory be annexed to the City;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARCOLA, DOUGLAS COUNTY, ILLINOIS, as follows:

Section 1. That the territory described in Exhibit A which is attached hereto and incorporated herein and being indicated on an accurate map in the said Exhibit A be and the same is hereby annexed to the City of Arcola, Douglas County, Illinois.

Section 2. Pursuant to Section 7-1-1 of the Illinois Municipal Code (65 ILCS 4/7-1-1), the new boundaries of the City of Arcola shall extend to the far side of any adjacent highway.

Section 3. That the City Clerk is hereby directed to record with the Recorder of Deeds and file with the County Clerk a certified copy of this ordinance together with the accurate map of the annexed territory appended to said ordinance.

Section 4. That this ordinance shall be in full force and effect from and after its passage, approval, and publication in pamphlet form as provided by law.

* * *

PASSED this 1st day of November, 2010, by a roll call vote as follows:

Voting in favor: Jordan, Ward, Williams, Moore, Beatty

Voting against: ______

Not voting: Kay

Carol Turner

Carol Turner, City Clerk

APPROVED this 1st day of November, 2010.

Larry Ferguson

Larry Ferguson, Mayor

CERTIFICATE

STATE OF ILLINOIS,)
) SS.
COUNTY OF DOUGLAS.)

I, the undersigned, hereby certify that I am the duly qualified and acting Clerk of the City of Arcola, in the County and State aforesaid, and as such Clerk I am the keeper of the official journal, records, and files of the City of Arcola of said City.

I do further certify that the attached and foregoing is a full, true and correct copy of Ordinance No. 10-S-11 entitled:

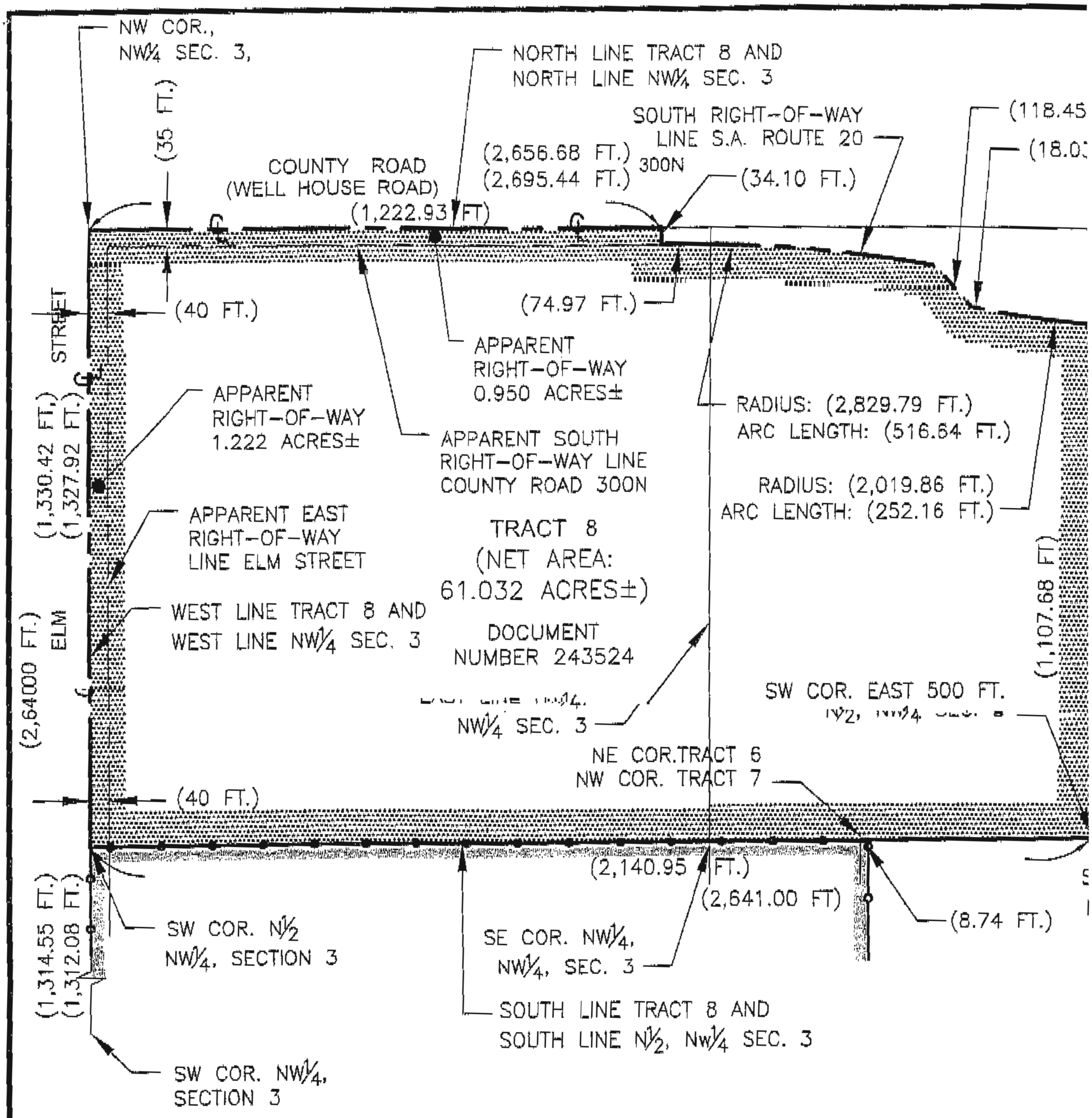
<u>AN ORDINANCE</u> annexing 63.204 acres to the City of Arcola, Douglas County, Illinois, (Libman Equipment LLC Property described as Part of the NEW1/4 of Section 3 T14N, R8E of the 3rd PM, Douglas County, Illinois).

as adopted by the City Council of the City of Arcola, Douglas County, Illinois, at its legally convened meeting held on the 1st day of November, 2010, and signed by the Acting Mayor on the 1st day of November, 2010, all as appears from the official records of said City, in my care and custody.

IN WITNESS WHEREOF, I have hereunto affixed by official signature and the corporate seal of said City of Arcola, Douglas County, Illinois, this 1st day of November, 2010.

(SEAL)

Carol Turner
CITY CLERK



AREA SUMMARY

NET AREA TRACT 8:	61.032 ACRES ±
COUNTY ROAD 300N APPARENT RIGHT-OF-WAY:	0.950 ACRES ±
ELM STREET APPARENT RIGHT-OF-WAY:	1.222 ACRES ±
TOTAL AREA:	63.204 ACRES ±

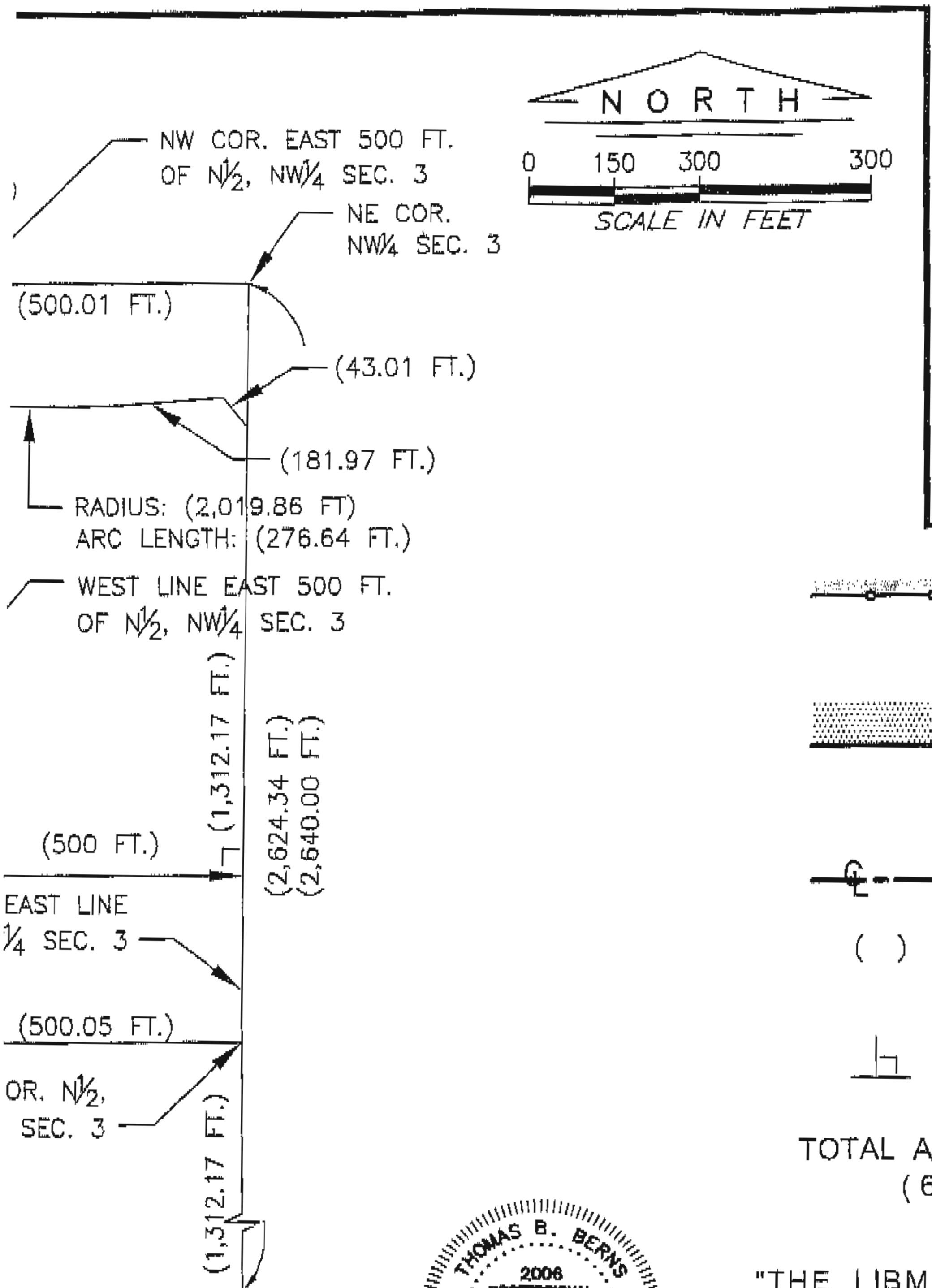


EXHIBIT A

EXISTING CORPORATE LIMITS OF THE CITY OF ARCOLA, DOUGLAS COUNTY, ILLINOIS

BOUNDARY OF TERRITORY PROPOSED TO BE ANNEXED TO THE CITY OF ARCOLA, DOUGLAS COUNTY, ILLINOIS

EXISTING CENTERLINE

( ) RECORD MEASUREMENT AND / OR DATA

DENOTES 90 DEGREES

TOTAL AREA TO BE ANNEXED:
(63.204 ACRES ±)

"THE LIBMAN COMPANY TRACT 8"

THOMAS B. BERNS
2006
PROFESSIONAL
LAND
SURVEYOR
STATE OF
ILLINOIS
URBANA, ILLINOIS

SIGNED AND SEALED OCTOBER 22, 2010

Thomas B. Berns

THOMAS B. BERNS, P.E., L.S., PRESIDENT
BERNS, CLANCY AND ASSOCIATES, P.C.
ILLINOIS PROFESSIONAL LAND SURVEYOR 2006
LICENSE EXPIRATION: NOVEMBER 30, 2012
URBANA, CHAMPAIGN COUNTY, ILLINOIS
ILLINOIS PROFESSIONAL DESIGN FIRM 2999
LICENSE EXPIRATION: APRIL 30, 2011

PLAT AND DESCRIPTION OF TERRITORY TO BE ANNEXED TO THE CITY OF ARCOLA, DOUGLAS COUNTY, ILLINOIS

PART OF NW¼ SECTION 3, T14N, R8E, 3PM, DOUGLAS COUNTY, ILLINOIS

CITY OF ARCOLA

BCA
BERNS, CLANCY AND ASSOCIATES
ENGINEERS • SURVEYORS • PLANNERS
405 EAST MAIN STREET - POST OFFICE BOX 755
URBANA, ILLINOIS 61803-0755
PHONE: (217) 384-1144 - FAX: (217) 384-3355

FILE: 3953-85.DWG	DATE:	SHEET 1 OF 2
JOB: 3953-85	102210	

Attachment D-16
Arcola Legal Notice Regarding November 10 and 11 Hearings

LEGAL NOTICE
CITY OF ARCOLA, DOUGLAS COUNTY, ILLINOIS

PLEASE TAKE NOTICE that on the 10th day of November, 2010, at the hour of 5:30 p.m., the City Council of the City of Arcola shall convene a meeting at which it will conduct a public hearing pursuant to Chapter 26, Article I, Section 5, Paragraph 4 of the Code of Ordinances of the City of Arcola. The City Council has planned for a second night of hearing to occur on November 11, 2010, if necessary.

Location:	**Arcola Center, 107 West Main Street, Arcola, Illinois 61910**
Time:	**5:30 PM (Central)**

FURTHER, the City Council will conduct a meeting to consider the approval or the disapproval of the application referenced below on November 15, 2010 at 7:00PM in the Council Chambers, City Hall, 114 North Locust, Arcola, Illinois.

Subject of Hearing: Wind Turbine Permit Application filed by Libman Equipment, LLC, 220 Sheldon Street, Arcola, Douglas County, Illinois 61910. Applicant is an Illinois limited liability company with its principal place of business in Arcola, Douglas County, Illinois. Applicant is the proposed operator of the wind energy facility. The Owner of the property on which the facility is to be constructed is Libman Equipment, LLC.

Libman Equipment, LLC has requested City authorization to construct a 1,500 kilowatt wind energy facility with a single turbine on a tubular steel tower of an approximate height of 85 meters (279 feet) and an approximate blade tip height of 406 feet above ground level (AGL) 1070 feet above mean sea level (AMSL). The approval provided, if any, may contemplate field adjustments that may increase the AGL height by roughly 3% (or slightly more than 12 feet AGL) based on conditions that develop following the hearing.

The proposed location of the wind energy facility is approximately 330 feet north of the south line of the property legally described below, approximately 1,202 feet east of the west line of the property legally described below, and approximately 903 feet west of the east line of the property legally described below (or, approximately, 39° 41' 33.502" Latitude, 88° 17' 50.677" Longitude)—all measured to the tubular steel tower. The wind turbine location lies within the southerly 20 acres (approximately) of a larger tract of land owned by Libman Equipment, LLC which is approximately 63.204 acres in size, bears the Permanent Index Numbers of 01-14-03-100-001, 01-14-03-100-002 and 01-14-03-100-003 and is legally described as follows:

> THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 14 NORTH, RANGE 8 EAST OF THE THIRD PRINCIPAL MERIDIAN, EXCEPT 4.45 ACRES OFF THE NORTH SIDE THEREOF FOR RIGHT-OF-WAY FOR RELOCATION OF S.A. ROUTE 20,AS CONVEYED TO THE STATE OF ILLINOIS BY DEED RECORDED IN DEED RECORD 148, PAGE 160, AND ALSO EXCEPT THE EAST 500 FEET THEREOF, ALL SITUATED IN DOUGLAS COUNTY, ILLINOIS.

Access to the wind energy facility is intended from U.S. Route 45 via County Route 300 N.

Attorneys for Petitioner: Patrick T. Fitzgerald, MEYER CAPEL, P.C. Athenaeum Building, 306 West Church Street, P.O. Box 6750, Champaign, IL 61826-6750, (217) 352-1800; Mark W. Daniel, DANIEL LAW OFFICE, P.C., 136 West Vallette Street, Suite 3, Elmhurst, Illinois 60126-4377, (630) 833-3311.

Upon the opening of the meeting, and in advance of the hearing, (1) attorneys representing parties participating in the hearing shall file their written appearance identifying their clients and (2) parties without counsel will be requested to identify themselves. The hearing will proceed according to rules of procedure that are available from the City Clerk's office in City Hall.

Documentation for this request is available for inspection in the Office of the City Clerk, Arcola City Hall, 114 North Locust, Arcola, Illinois 61910. In compliance with the Americans with Disabilities Act, the City Council requests that persons requiring accommodations contact the City Clerk at (217) 268-4966 24-hours before the meeting.

Certificate of Publication

ARCOLA RECORD-HERALD
Arcola, Illinois

STATE OF ILLINOIS }
COUNTY OF DOUGLAS } ss.

I, Chris Slack, do hereby certify that I am the publisher of the Arcola Record-Herald, a weekly secular newspaper of general circulation as defined in Act — Chapter 100, Sections 1 and 5, Illinois Revised Statutes; that said newspaper is being published and has been published in the City of Arcola, County of Douglas and State of Illinois, for more than one year prior to the date of the first insertion of the notice annexed hereto; that said annexed notice was published in said newspaper in each and every copy and impression hereof for One consecutive weeks commencing on the 28th day of October, 2010, and ending on the 28th day of October, 2010, which are the dates of the first and last paper containing the same.

Given under my hand this 28th day of October 2010

Cindy Slack, Publisher
ARCOLA RECORD-HERALD

Printer's Fees $ ....

Attachment D-17
Libman Informational Letter Concerning November 10 and 11, 2010 City of Arcola Hearings

Law Offices of
MEYER CAPEL
A PROFESSIONAL CORPORATION

Telephone: 217/352-1800
Facsimile: 217/352-1083
http://www.meyercapel.com

306 West Church Street
P.O. Box 6750
Champaign, Illinois 61826-6750

James L. Capel, Jr (1933-1991)

PATRICK T. FITZGERALD
pfitzgerald@meyercapel.com

November 5, 2010

Libman Equipment, LLC has requested permission to construct a single turbine wind energy conservation system north of its plant in Arcola. You may have attended a meeting on this issue or read about it in the newspaper. The turbine is proposed in order to allow Libman Company to benefit from the power generated, reduce operating expenses and improve its competitive position while remaining the largest employer in the area that supports many Arcola and Douglas County businesses both directly and indirectly.

The project is progressing down two paths at the present time. First, the City of Arcola must approve the turbine. Second, due to the fact that this project is being considered as one supported by federal funds, a distinct process will consider and evaluate the environmental impact through a process initiated at the United States Department of Energy. This letter relates to the Arcola process only.

Enclosed with this letter, you will find a copy of the published legal notice informing you of two hearing nights hosted by Arcola: November 10 and November 11. The hearings will begin at 5:30 PM. At these hearings, Libman Equipment, LLC will present the basis for its application through witnesses that include a handful of engineers, an attorney, an appraisal consultant and a land planner. You will be able to hear the testimony and observe the exhibits at hearing.

All of the witnesses have substantial experience in their fields and they wish to provide testimony efficiently and completely. Libman asks that you consider evaluating the locator plan which is also enclosed with this letter and providing concerns and specific questions that you might have by electronic mail to its attorneys (understanding that, if you have your own attorney for this issue, you should not do so other than through your lawyer). The submission of questions in advance will allow Libman to include answers in its presentation and hopefully allow for a hearing process that is more convenient to all of those involved in the process.

Libman has retained this firm and DANIEL LAW OFFICE, P.C. for the purposes of taking this application to hearing. Both attorneys involved have lived the larger part of their lives in East Central Illinois and you should email them when you have the desire and opportunity at pfitzgerald@meyercapel.com (for Patrick Fitzgerald) and mark@thedaniellawoffice.com (for Mark

November 5, 2010

Daniel). Please contact Mark Daniel by electronic mail if you wish to view the exhibits that will be relied on at hearing.

Some background on the evaluation of the turbine proposal may help you in advance. First, Libman has obtained or will obtain all required federal and state authorizations and approvals ranging from wildlife and archeological approvals to microwave and aviation matters. Second, Libman must satisfy the Arcola ordinances governing the project. Third, and most importantly, Libman has evaluated the project and possible effects of the project with its several professionals. In this regard, please note: (a) noise from the project will meet local standards and the standards of the Illinois Pollution Control Board; (b) shadow flicker was evaluated on a worst-case basis and on an actual conditions basis taking into account the weather and surrounding conditions and Libman's turbine will not create nearly as many hours of shadow flicker per year that would lead to mitigation planning (roughly 14 hours per year as opposed to the accepted mitigation concern level of 30 hours per year); (c) the turbine will appear as you would expect it to and not be painted in a fashion that does not blend with the surroundings; (d) there will be no outdoor storage; (e) waste will be handled as required by the Arcola code; (e) the turbine will be non-mountable, so there should be no need for a protective fence; and (f) access from public roads will be handled according to road and road repair plans that steer turbine-related traffic to a north entrance along East 300N Road.

Libman has been an important component of life in Arcola since 1957. Most of its employees reside in Arcola. It wishes to proceed through this hearing with a high level of respect for Arcola residents and their concerns. Please consider following up on this invitation to communicate your questions and concerns and understand that we look forward to seeing you at hearing.

Cordially,

Patrick T. Fitzgerald

PTF:tp
Enclosure

LEGAL NOTICE
CITY OF ARCOLA, DOUGLAS COUNTY, ILLINOIS

PLEASE TAKE NOTICE that on the 10th day of November, 2010, at the hour of 5:30 p.m., the City Council of the City of Arcola shall convene a meeting at which it will conduct a public hearing pursuant to Chapter 26, Article I, Section 5, Paragraph 4 of the Code of Ordinances of the City of Arcola. The City Council has planned for a second night of hearing to occur on November 11, 2010, if necessary.

Location: Arcola Center, 107 West Main Street, Arcola, Illinois 61910
Time: 5:30 PM (Central)

FURTHER, the City Council will conduct a meeting to consider the approval or the disapproval of the application referenced below on November 15, 2010 at 7:00PM in the Council Chambers, City Hall, 114 North Locust, Arcola, Illinois.

Subject of Hearing: Wind Turbine Permit Application filed by Libman Equipment, LLC, 220 Sheldon Street, Arcola, Douglas County, Illinois 61910. Applicant is an Illinois limited liability company with its principal place of business in Arcola, Douglas County, Illinois. Applicant is the proposed operator of the wind energy facility. The Owner of the property on which the facility is to be constructed is Libman Equipment, LLC.

Libman Equipment, LLC has requested City authorization to construct a 1,500 kilowatt wind energy facility with a single turbine on a tubular steel tower of an approximate height of 85 meters (279 feet) and an approximate blade tip height of 406 feet above ground level (AGL)
1070 feet above mean sea level (AMSL). The approval provided, if any, may contemplate field adjustments that may increase the AGL height by roughly 3% (or slightly more than 12 feet AGL) based on conditions that develop following the hearing.

The proposed location of the wind energy facility is approximately 330 feet north of the south line of the property legally described below, approximately 1,202 feet east of the west line of the property legally described below, and approximately 903 feet west of the east line of the property legally described below (or, approximately, 39° 41' 33.502" Latitude, 88° 17' 50.677" Longitude)—all measured to the tubular steel tower. The wind turbine location lies within the southerly 20 acres (approximately) of a larger tract of land owned by Libman Equipment, LLC which is approximately 63.204 acres in size, bears the Permanent Index Numbers of 01-14-03-100-001, 01-14-03-100-002 and 01-14-03-100-003 and is legally described as follows:

> THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 14 NORTH, RANGE 8 EAST OF THE THIRD PRINCIPAL MERIDIAN, EXCEPT 4.45 ACRES OFF THE NORTH SIDE THEREOF FOR RIGHT-OF-WAY FOR RELOCATION OF S.A. ROUTE 20 AS CONVEYED TO THE STATE OF ILLINOIS BY DEED RECORDED IN DEED RECORD 148, PAGE 160, AND ALSO EXCEPT THE EAST 500 FEET THEREOF, ALL SITUATED IN DOUGLAS COUNTY, ILLINOIS.

Access to the wind energy facility is intended from U.S. Route 45 via County Route 300 N.

Attorneys for Petitioner: Patrick T. Fitzgerald, MEYER CAPEL, P.C., Athenaeum Building, 306 West Church Street, P.O. Box 6750, Champaign, IL 61826-6750, (217) 352-1800; Mark W. Daniel, DANIEL LAW OFFICE, P.C., 136 West Vallette Street, Suite 3, Elmhurst, Illinois 60126-4377, (630) 833-3311.

Upon the opening of the meeting, and in advance of the hearing, (1) attorneys representing parties participating in the hearing shall file their written appearance identifying their clients and (2) parties without counsel will be requested to identify themselves. The hearing will proceed according to rules of procedure that are available from the City Clerk's office in City Hall.

Documentation for this request is available for inspection in the Office of the City Clerk, Arcola City Hall, 114 North Locust, Arcola, Illinois 61910. In compliance with the Americans with Disabilities Act, the City Council requests that persons requiring accommodations contact the City Clerk at (217) 268-4966 24-hours before the meeting.

Alicia Wilson
509 N. Locust St.
Arcola, IL 61910

C. W. Chancellor
511 N. Locust St.
Arcola, IL 61910

Beachy's Ice Company
523 1/2 N. Locus
Arcola, IL 61910

Albert Beachy
523 N. Locust St.
Arcola, IL 61910

Anthony Chrisagis
601 N. Locust St.
Arcola, IL 61910

Rachael Plummer
605 N. Locust St.
Arcola, IL 61910

Juan Moreno
202 Polk Dr.
Arcola, IL 61910

Sandra Cortez
208 Polk Dr.
Arcola, IL 61910

Jaime Cantu
212 Polk Dr
Arcola, IL 61910

Rosa N. Franco
216 Polk Dr.
Arcola, IL 61910

Francisco Guzman
220 Polk Dr.
Arcola, IL 61910

Francisco & Glori Cortez
224 Polk Dr.
Arcola, IL 61910

Nancy Brummett
228 Polk Dr.
Arcola, IL 61910

John Ireland
232 Polk Dr.
Arcola, IL 61910

Anita Lewellyn
236 Polk Dr.
Arcola, IL 61910

Terri Condarco
240 Polk Dr.
Arcola, IL 61910

Jorge Arguelles
244 Polk Dr.
Arcola, IL 61910

Lee Bowman
248 Polk Dr.
Arcola, IL 61910

Clinton Burke
252 Polk Dr.
Arcola, IL 61910

Angela Cantu
256 Polk Dr.
Arcola, IL 61910

Linda Leach
260 Polk Dr.
Arcola, IL 61910

Boyd/ 439 Elm Street LLC
439 N. Elm St.
Arcola, IL 61910

Myra S. Beachy
435 N. Elm St.
Arcola, IL 61910

Bob Spear
429 N. Elm St.
Arcola, IL 61910

Rusty Brown
421 N. Elm St.
Arcola, IL 61910

Janice Gee
425 N. Elm St.
Arcola, IL 61910

Byron Joergens
253 Polk Dr.
Arcola, IL 61910

Brad Lebeter
273 Circle Dr.
Arcola, IL 61910

Brian Lebeter
269 Circle Dr.
Arcola, IL 61910

Karla & Justin Kutz
265 Circle Dr.
Arcola, IL 61910

Neighbor
261 Circle Dr.
Arcola, IL 61910

James Eickberg
257 Circle Dr.
Arcola, IL 61910

Shannon Nall
253 Circle Dr.
Arcola, IL 61910

April & Rodney Adams
249 Circle Dr.
Arcola, IL 61910

Sasha Gillenwater
245 Circle Dr.
Arcola, IL 61910

Steve Joergens
235 Circle Dr.
Arcola, IL 61910

Merle Plank
237 Circle Dr.
Arcola, IL 61910

Rick Fiala
239 Circle Dr.
Arcola, IL 61910

Shay Gibson
229 Circle Dr.
Arcola, IL 61910

Epigmenio Leal
225 Circle Dr.
Arcola, IL 61910

Amie Ade
221 Circle Dr.
Arcola, IL 61910

Kenneth Horenkamp
217 Circle Dr.
Arcola, IL 61910

Cindy Jumper
213 Circle Dr.
Arcola, IL 61910

David & Amy Wilson
209 Circle Dr.
Arcola, IL 61910

Wilma Cain
205 Circle Dr.
Arcola, IL 61910

Telva Williams
201 Circle Dr.
Arcola, IL 61910

Debra J. Rich
208 Circle Dr.
Arcola, IL 61910

Mike Gomez
212 Circle Dr.
Arcola, IL 61910

Neighbor
216 Circle Dr.
Arcola, IL 61910

Jean Tomlin
224 Circle Dr.
Arcola, IL 61910

Neighbor
226 Circle Dr.
Arcola, IL 61910

Richard J. Housley
228 Circle Dr.
Arcola, IL 61910

Steve Gates
232 Circle Dr.
Arcola, IL 61910

Heather Gobert
260 Circle Dr.
Arcola, IL 61910

Rick Hackler
264 Circle Dr.
Arcola, IL 61910

Theresa Croslow
272 Circle Dr.
Arcola, IL 61910

Jose J. Garza
249 Polk Dr.
Arcola, IL 61910

Elise Scott
245 Taft Dr.
Arcola, IL 61910

Dennis Melton
229 Polk Dr.
Arcola, IL 61910

Valente Garcia
225 Polk Dr.
Arcola, IL 61910

Earl Gudenrath
221 Polk Dr.
Arcola, IL 61910

Carla King
217 Polk Dr.
Arcola, IL 61910

Vicente Silguero
604 Poplar Pl.
Arcola, IL 61910

Toney A. Blanchard
610 Poplar Pl.
Arcola, IL 61910

Harold Tefft
218 Taft Dr.
Arcola, IL 61910

Jack Conner
226 Taft Dr.
Arcola, IL 61910

Graciela Valdez
230 Taft Dr.
Arcola, IL 61910

Edgar Hernan Torres
234 Taft Dr.
Arcola, IL 61910

Jaime Arguelles
241 Taft Dr.
Arcola, IL 61910

James V. Slaughter
237 Taft Dr.
Arcola, IL 61910

Jesus Gonzalez
233 Taft Dr.
Arcola, IL 61910

Terry Nale
229 Taft Dr.
Arcola, IL 61910

Pattie Kester
225 Taft Dr.
Arcola, IL 61910

Samantha Jones
221 Taft Dr.
Arcola, IL 61910

Wilford Stark
217 Taft Dr.
Arcola, IL 61910

Daniel Mendoza
616 Poplar Pl.
Arcola, IL 61910

Anna Embry
620 Poplar Pl.
Arcola, IL 61910

Dorothy Aspengren
220 Tyler Dr.
Arcola, IL 61910

C. King & Erma Edwards
224 Tyler Dr.
Arcola, IL 61910

Cecil Gates
228 Tyler Dr.
Arcola, IL 61910

Shirley Taylor
232 Tyler Dr.
Arcola, IL 61910

Kara M. Rickfelder
240 Tyler Dr.
Arcola, IL 61910

Aida Rosas
244 Tyler Dr.
Arcola, IL 61910

Charles Towle
241 Tyler Dr.
Arcola, IL 61910

Ruben Rodriguez
237 Tyler Dr.
Arcola, IL 61910

Fabian Herrera
233 Tyler Dr.
Arcola, IL 61910

Jerry Livingston
229 Tyler Dr.
Arcola, IL 61910

Larry Stovall
225 Tyler Dr.
Arcola, IL 61910

Charles Dowler
221 Tyler Dr.
Arcola, IL 61910

Kenny Monke
217 Tyler Dr.
Arcola, IL 61910

Fernando J. Campos Jr.
630 Poplar Pl.
Arcola, IL 61910

Richard A. Edwards
637 Poplar Pl.
Arcola, IL 61910

M.A. Mulrooney
633 Poplar Pl.
Arcola, IL 61910

Neighbor
629 Poplar Pl.
Arcola, IL 61910

Danny Gullion
627 Poplar Pl.
Arcola, IL 61910

Kathy Reece
617 Poplar Pl.
Arcola, IL 61910

Jose A. Gonzalez
613 Poplar Pl.
Arcola, IL 61910

Manuela Leal
609 Poplar Pl.
Arcola, IL 61910

Paul A. Rippey
605 Poplar Pl.
Arcola, IL 61910

Shirley McNary
203 Polk Pl.
Arcola, IL 61910

Neighbor
607 N. Locust St.
Arcola, IL 61910

Neighbor
609 N. Locust St.
Arcola, IL 61910

Bailey Fulton
617 N. Locust St.
Arcola, IL 61910

Chris Good
623 N. Locust St.
Arcola, IL 61910

Maria Morales
633 N. Locust St.
Arcola, IL 61910

Duane Ingram
639 N. Locust St.
Arcola, IL 61910

Gary Philippi
701 N. Locust St.
Arcola, IL 61910

Terry Knaus
707 N. Locust St.
Arcola, IL 61910

Dorothy Moody
711 N. Locust St.
Arcola, IL 61910

Scott Lathrop
715 N. Locust St.
Arcola, IL 61910

Liberty K. Doemelt
719 N. Locust St.
Arcola, IL 61910

Clay Doemelt
777 N. Locust St.
Arcola, IL 61910

Fleurette Hatteberg
801 N. Locust St.
Arcola, IL 61910

Louis Turner
901 E. CR 300N
Arcola, IL 61910

Raymundo Garza
805 N. Locust St.
Arcola, IL 61910

Neighbor
716 N. Locust
Arcola, IL 61910

Tom & Bernice Marlow
528 N. Locust St.
Arcola, IL 61910

Aldo & Blanca Garcia
510 N. Locust St.
Arcola, IL 61910

Terri Cherry
506 N. Locust St.
Arcola, IL 61910

Lorenso Ruiz
410 N. Locust St.
Arcola, IL 61910

Arturo L. Zendeja
404 N. Locust St.
Arcola, IL 61910

Suzanne Glende
629 Poplar Pl.
Arcola, IL 61910

Gabriela Carreon
224 Taft Dr.
Arcola, IL 61910

Jesus A. Dela Garza
226 Circle Dr.
Arcola, IL 61910

Kenny Logan
400 N. Locust St.
Arcola, IL 61910

Arley Clifford Adams
636 Poplar Pl.
Arcola, IL 61910

Rogelio Cavazos
236 Tyler Dr.
Arcola, IL 61910

Neighbor
401 N. Locust St.
Arcola, IL 61910

Ismelda Aguilar
216 Circle Dr.
Arcola, IL 61910

Attachment D-18
Libman Wind Turbine Bus Tour Newspaper Article

Libman Co. Plans Bus Trip To Turbine Sites

By Chris Slack

At a public hearing in August, Libman Company officials stated their willingness to sponsor a tour of locations which are hosts to wind turbines.

Libman's is following through on that promise.

On Saturday, October 16, Libman's is chartering a bus trip to wind turbine locations in Geneseo and Manlius. The locations were selected by the Arcola City Council, according to Aaron Libman of the Libman Company.

Libman said he hopes the concerns expressed by local residents relating to the Libman Company's proposal to construct a large wind turbine north of its manufacturing facility will be alleviated once they visit similar project sites.

An e-mail from Libman on Monday detailed the itinerary for the one-day trip to the two communities, both of which are located in the northwest quadrant of Illinois. The bus is scheduled to leave at 8 a.m.

Geneseo, with a population of about 6,000, is located on Interstate 80 about 30 minutes east of the Quad Cities.

Manlius' population is about 400 and is north of I-80 near Illinois 40. Bureau Valley High School, just west of Manlius, is the site of a wind turbine.

Libman said he hopes that the majority of the city council members will plan on attending. He also invited and encouraged any interested residents wanting to know more about the wind turbine project to participate in the tour.

A sign-up sheet has been posted at Arcola City Hall, 114 N. Locust St. The deadline for sign-up is October 10.

Below is the itinerary for the wind turbine site tour:

8 a.m. — Depart Arcola City Hall.

11:45 a.m. — Arrive in Geneseo.

11:45 a.m. to 12:30 p.m. — Lunch, question-and-answer period with Lewis Opsal, electrical superintendent.

12:30 to 1:15 p.m. — Tour with Mr. Opsal.

1:15 p.m. — Departure from Geneseo.

2:25 p.m. — Arrival at Bureau Valley in Manlius.

2:25 to 3:30 p.m. — Tour with Jon Bute, superintendent of schools at Bureau Valley.

3:30 p.m. — Departure from Manlius.

7:15 p.m. — Arrival in Arcola.

Libman said the company has launched this project in an effort to control costs while also showing its willingness to invest in renewable energy.

The proposed 1.5-megawatt turbine is over 400 feet in height, which has led to concerns about noise levels and shadow flicker from residents in the area of the proposed turbine location.

Opponents of the Libman proposal have also indicated a fear of declining property values if the project is allowed to proceed.

A website has been developed that contains key documents in relation to the proposed project. The documents include information on shadow flicker, noise, public health impacts of wind turbines and a comprehensive property value study. It also includes site plans of the area Libman is proposing to build the wind turbine.

For those interested in learning more about the Libman proposal, go to **www.libmanwind.com**.

OMMUNITY AGENDA?

service to the community of Arcola.

*****

▪ Lincolnland Hospice Memorial Service:
The public is invited to attend the Lincolnland Hospice memorial service at 2 p.m. Sunday, October 10, in the Lumpkin Family Center for Health Education at Sarah Bush Lincoln Health Center. The memorial service, in which names of loved ones will be read and remembered, is open to anyone who has experienced a loss. For more information about Lincolnland Hospice or the memorial service, call 1-800-454-4055.

R-H Newsstand Locations

The ***Arcola Record-Herald*** is available each week at these area locations:

In Arcola: Casey's General Store, Arcola IGA, Browne's Pharmacy, Molina's Meat Market, Arcola Country Store & Gas, Vyverberg's, Dutch Kitchen, Country Charm and Hen House.
Rural Arcola: Country Salvage.
In Chesterville: Korner Cafe.
In Hindsboro: Five N's.
In Tuscola: Tuscola IGA.

INSIDE THIS WEEK'S ISSUE

HOW TO REACH US

• **To fax news** and advertising materials to the Record-Herald, please call 217-268-4938. The deadline is 5 p.m. each Monday.

• **The street address** is 118 E. Main. The newspaper's mailing address is P.O. Box 217, Arcola, IL 61910. Phone 268-4950.

• **E-mail the newspaper at:**
slackpub@consolidated.net

Arcola Record Herald

Attachment D-19

Libman Draft - Turbine Ordinance with Example Approval Language (2010-1117)

STATE OF ILLINOIS)
) SS
COUNTY OF DOUGLAS)

ORDINANCE NO. 10-S-_______
(LIBMAN DRAFT NO. 1)

AN ORDINANCE GRANTING A CHAPTER 26 PERMIT TO THE LIBMAN COMPANY AND LIBMAN EQUIPMENT, LLC FOR A 1.5MW WIND ENERGY CONVERSION SYSTEM IN THE CITY OF ARCOLA, ILLINOIS

WHEREAS, The Libman Company (as the proposed owner and operator of a wind energy conversion system ("WECS")) and Libman Equipment, LLC (as owner of the real estate underlying the proposed WECS), a limited liability company related to The Libman Company, for the benefit of an existing industrial use operated by The Libman Company, filed an application to build and operate, a single WECS to be placed on property located west of Elm Street, north of The Libman Company plant, south of East 300 Road North and west of Interstate 57; and

WHEREAS, said Property is zoned RD Rural Development, lies within the City's corporate limits and is legally described in Exhibit "A" and shown in Exhibit "B" attached hereto; and

WHEREAS, the City is authorized under the Municipal Zoning Enabling Act, as amended, to regulate WECS and to exercise powers recited in 65 ILCS 5/11-13-26; and

WHEREAS, the City regulates the location of WECS under Chapter 26 of its Code of Ordinances and it exercises this power in the adoption of this Ordinance; and

WHEREAS, to the extent its zoning regulations contained within Chapter 26 are not superseded by Chapter 26, the City also regulates land uses and structures under the performance standards in Chapter 25 of its Code of Ordinances and it exercises this power in the adoption of this Ordinance; and

WHEREAS, to the extent the Code of Ordinances is otherwise applicable, the City has considered these laws and regulations; and

WHEREAS, this Ordinance is intended to supersede local ordinances previously adopted, but nothing in this Ordinance is not intended to supersede any controlling state or federal laws or regulations and it is the intent of the City Council that this Ordinance shall be interpreted in this fashion; and

WHEREAS, following due and proper notice by publication in the Arcola Record-Herald on October 28, 2010, the City Council conducted a public hearing on November 10 (announced as reconvened on November 15), November 15 (announced as reconvened on November 17), November 17 (announced as reconvened on November 22) and November 22, 2010, said hearing being convened for receipt and consideration of evidence including exhibits and testimony; and

WHEREAS, the public hearing conducted was the subject of correspondence delivered by mail and by hand through counsel for Libman on November 5, 2010 and November 8, 2010 to addressees/occupants of structures in Arco Acres and in Prairie Lakes Estates; and

WHEREAS, following a relocation of the turbine following application, the notices referenced above were published and delivered and the public hearing convened on November 10, 2010, November 15, 2010, and November 17, 2010; and

WHEREAS, the City Council finds that each phase of the hearing was convened, continued and reconvened properly on the above-noted dates, as required by 65 ILCS 5/11-13-26(a) and 5 ILCS 120/1 *et seq.*; and

WHEREAS, at this public hearing, the applicant and members of the public testified both in favor and in opposition to the proposal; and

WHEREAS, the City Council, having considered the evidence, testimony and exhibits presented at the public hearing, made a report and findings of fact and directed that the City Attorney prepare an ordinance approving the requested WECS Permit as set forth in the Findings of Fact dated November 30, 2010 and this report and the findings of fact, and the vote of the City Council thereon as well as this Ordinance, serve as the decision of the City Council on this application; and

WHEREAS, the City Council has acted on this Ordinance after having again considered the evidence, testimony and exhibits as well as this Ordinance; and

WHEREAS, the City Council finds that the there was at least one public hearing not more than thirty (30) days prior to the siting decision by the corporate authorities of the City on this date, December 6, 2010; and

WHEREAS, the City Council has reviewed the testimony and exhibits presented at the aforesaid public hearing and has considered the findings of fact and this Ordinance, and has determined to approve the WECS Permit subject to conditions, set forth in Exhibit "C" attached hereto; and

WHEREAS, the City Council finds that granting the WECS Permit to allow construction and operation of a single-turbine WECS on the subject property, with conditions, is consistent with the requirements established by Chapter 26 of the Code of Ordinances of the City of Arcola as well as the performance standards in the Zoning Ordinance of the City of Arcola (Chapter 25);

NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND ALDERPERSONS, ACTING AS THE CORPORATE AUTHORITIES, OF THE CITY OF ARCOLA, DOUGLAS

COUNTY, ILLINOIS, AS FOLLOWS:

SECTION ONE: The Findings of Fact and Decision of the City Council attached hereto as Exhibit "D", are hereby accepted, and the findings of fact set forth above are hereby adopted as the findings of fact and conclusions of the City Council and this Ordinance shall serve as the final decision of the City Council to approve the request for a WECS permit with conditions. The foregoing recitals are hereby incorporated into this Ordinance as if fully set forth herein.

SECTION TWO: Based on the findings of fact set forth above, a WECS Permit is hereby granted to The Libman Company to construct and operate a WECS on property located in the City and legally described in Exhibit "A" attached hereto and at the location depicted in Exhibit "B".

SECTION THREE: This grant of this WECS Permit is subject to the conditions set forth in Exhibit "C" attached hereto. As a condition for the grant of this WECS Permit, The Libman Company and its successors and assigns, accepts and agrees to be bound by the terms and conditions of Exhibit "C." The conditions set forth in Paragraphs __ of Exhibit "C" are hereby incorporated into this Ordinance and shall be enforceable under Article 1, Division 2 and Article 11, Division 13, Paragraph 15 of the Illinois Municipal Code, 65 ILCS 5/1-2-1 *et seq*. and 65 ILCS 5/11-13-15.

SECTION FOUR: This Ordinance shall be in full force and effect upon its adoption by the City Council of the City of Arcola, Douglas County, Illinois. To the extent that this Ordinance is intended to set a standard for performance under the terms of this WECS Permit for the construction and operation of this WECS, the sections imposing affirmative obligations or setting a standard shall be deemed effective ten (10) days following publication as provided for in 65 ILCS 5/1-2-4. The publication of this Ordinance in accord with 65 ILCS 5/1-2-4 does not delay or otherwise affect the effective date of the WECS Permit. The effective date of this Ordinance for all operative provisions of Exhibit C and for the purpose of rendering a decision under 65 ILCS 5/11-13-26(a) shall be the date of adoption, specifically, December 6, 2010.

SECTION FIVE: Failure of The Libman Company, the owners or other party in interest or a subsequent owner or other party in interest to comply with the terms of this Ordinance, after execution of such Ordinance, shall subject The Libman Company, the owners or party in interest to the penalties, if any, set forth in Chapters 26 of the Code of Ordinances.

SECTION SIX: Each and all of the various portions of this Ordinance, including each and all of the conditions of Exhibit C, are hereby expressly declared to be severable, and the invalidity of any such portion of this Ordinance shall not affect the validity of any other portions of this Ordinance, which shall be effective and enforced to the fullest extent possible. All ordinances or portions of ordinances previously passed or adopted by the City Council of the City of Arcola that conflict with or are inconsistent with the provisions of this Ordinance are hereby repealed.

SECTION SEVEN: The WECS Permit afforded under this Ordinance shall be deemed transferable and assignable as set forth in Chapter 26 and otherwise and it shall run with the land legally described herein (as initially provided and as the legal description is substituted following construction of the improvements as set forth in Condition No. __ in Exhibit "C").

SECTION EIGHT: The Clerk is hereby directed to publish this Ordinance in pamphlet form in accord with 65 ILCS 5/1-2-4 in order that a violation hereof shall lead to a fine or enforcement hereof, to file this Ordinance of record in the Office of the Recorder of Deeds for the County of Douglas, State of Illinois and to take all other steps deemed necessary to place the same of record publicly and within the City. The City Attorney is hereby directed to immediately provide a written decision delivered by certified mail, return receipt requested, to the interested parties who appeared at the hearing.

SECTION NINE. Staff is hereby directed as follows: (a) to provide a copy of this Ordinance to the County Clerk of Douglas County; (b) to provide a copy of this Ordinance to the United States Department of Energy; (c) to provide a copy of this Ordinance to the Office of the Governor of the State of Illinois; (d) to provide a copy of this Ordinance to the police, fire and life safety providers that provide service to any area within 250 feet of any property line of the tract of land described in Exhibit "A"; and (e) to provide a copy of this Ordinance to the township highway commissioner for any road appearing in the transportation plan as one to be utilized in the transportation of parts and materials for the construction and major maintenance of the approved Wind Energy Conversion System.

PASSED BY THE CITY COUNCIL THIS 6TH DAY OF DECEMBER, 2010, A.D., PURSUANT TO ROLL CALL VOTE REFLECTED BELOW

____
Larry Ferguson, Mayor, City of Arcola
Dated: December 6, 2010

ATTEST:

____
Carol Turner, City Clerk, City of Arcola
Dated: December 6, 2010

Ayes:
Nays:
Absent:
Abstain:

PUBLISHED IN PAMPHLET FORM ON THIS 7TH DAY OF DECEMBER, 2010.

____
CITY CLERK

EXHIBIT "A"
LEGAL DESCRIPTION OF SUBJECT PROPERTY

The property on which the Wind Energy Conversion System (WECS) will be located is zoned RD Rural Development, and identified by the approximate coordinates 39° 41' 33.502" Latitude, 88° 17' 50.677" Longitude.

Until such time as this description is substituted in accordance with Condition No. __ in Exhibit C, the 63.204-acre (+/-) property is and shall be legally described as follows:

> THE NORTH HALF OF THE NORTHWEST QUARTER OF SECTION 3, TOWNSHIP 14 NORTH, RANGE 8 EAST OF THE THIRD PRINCIPAL MERIDIAN, EXCEPT 4.45 ACRES OFF THE NORTH SIDE THEREOF FOR RIGHT-OF-WAY FOR RELOCATION OF S.A. ROUTE 20 AS CONVEYED TO THE STATE OF ILLINOIS BY DEED RECORDED IN DEED RECORD 148, PAGE 160, AND ALSO EXCEPT THE EAST 500 FEET THEREOF, ALL SITUATED IN DOUGLAS COUNTY, ILLINOIS.

Permanent Index Numbers:
01-14-03-100-001, 01-14-03-100-002, 01-14-03-100-003

EXHIBIT “B”
LOCATOR PLAN AND SITE PLAN

EXHIBIT "C"
LIBMAN EQUIPMENT, LLC
WIND TURBINE CONDITIONS

1. The Libman Company ("Libman") shall locate the wind tower where so as depicted in Exhibit "B", unless written approval is provided by the City. Property owners abutting the property must approve any setback from their property line smaller than 457 feet. Distance shall be measured from the center of the base of the tower at ground level. The minimum distance between the ground and any protruding blade(s) utilized on a wind tower shall be one hundred twenty (120) feet, as measured at the lowest point of the arc of the blades. The height of the mounted turbine to the tip of the blade extended above the tower shall not exceed four hundred six (406) feet measured from the base of the tower at ground level. The height of the tower shall not exceed 85 meters measured from the base of the tower at ground level to the center line of the hub of the rotor. This first condition may be adjusted based on design and field adjustments so that these heights may be changed provided that nothing shall cause the tower and blade extended above the tower to be taller than 415 feet unless The Libman Company amends this WECS Permit through the City Council.

2. Except as provided herein, the setback distance for wind towers shall be 1,000 feet or more from any residence in existence at the time of this approval, and from the boundary of any lot in an existing, platted and recorded residential subdivision, which was occupied or existed as of November 10, 2010. Distance shall be measured at the time of application for Building Permit from the center of the base of the tower at ground level to the outside surface of the closest foundation wall of any existing or occupied residence or to the closest recorded developable lot line for a platted subdivision, provided further that no wind tower shall be closer than 457 feet from any point on a property line of a non-participating property containing an existing residence. The tower may be placed as near as 600 feet from any occupied residence with the prior written approval of the owners, which shall be submitted as part of the Building Permit application.

3. This WECS Permit is intended to provide conditions to allow the wind turbine, tower and related communications and electrical facilities. All wind power facility equipment and construction of the WECS shall be in compliance with generally accepted engineering standards and all applicable City, State and federal regulatory standards including, but not limited to, the Uniform Building Code as adopted by the State of Illinois, the National Electrical Code as adopted by the State of Illinois, FAA requirements, EPA regulations (hazardous waste, construction, storm water, etc.) and any other statutory or regulatory requirements, subject to these conditions. Facility equipment shall conform to applicable industry standards including the IEC standards for wind turbine design for Class IIIA sites with wind speeds at hub height of less than 7.5 m/s and related standards adopted by the American Standards Institute (ANSI). Libman shall submit certificates from equipment manufacturers that the equipment is manufactured in compliance with industry standards if it has not already done so.

4. Libman 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

City on or before issuance of the first Building Permit for the individual wind tower. Building Permits shall be obtained from the City for the wind tower.

5. Libman shall work with local rescue authorities to provide training (at Libman's expense) to personnel who can assist with a rescue from the wind turbine or tower.

6. Libman shall not knowingly operate the turbine in a fashion that will cast shadow flicker between the hours of 6:00 AM and 9:00 AM on the residential structures existing on November 10, 2010 which are located west of a north-south line drawn from the center of the turbine. Libman shall either assign the duty to operate (or not) the turbine to employees charged with the authority to turn off the turbine. Alternatively, Libman may use a device that electronically controls the operation of the turbine to comply with this condition. Libman shall plan for the planting of trees or, alternatively, other remedies agreed to between Libman and the owner of the property situated at ___ East CR300 N if the average hours of shadow flicker per year during the life of the turbine exceed 30 hours annually. This provision shall be released as to particular properties upon the provision by Libman of a fully executed and recorded consent agreement for owners of properties mentioned in this Condition No. 6

7. If any television, cell phone, internet, or broadcast radio frequency interference is shown to be created by the WECS, Libman shall use commercially reasonable efforts to mitigate any problems on a case-by-case basis.

8. Construction shall commence within 18 months of the date of this WECS Permit, with operations to commence within 18 months after issuance of the first Building Permit, barring Acts of God and events that are beyond the control of Libman. The City Council may grant an extension of the foregoing time periods upon Libman showing reasonable justification for such a request. After construction is complete, Libman shall provide a certification to the City Administrator showing the location of the wind tower, road, transmission lines and all other improvements related to the wind tower (collectively, the "Improvements") and a legal description of the land utilized for the Improvements. This WECS Permit shall thereafter automatically be modified to limit the legal description of the area of the WECS to the land utilized for the Improvements. The City Council shall consider the modification of the WECS Permit at a regular business meeting. The City Council shall accept the new legal description upon the confirmation by the City Engineer that the new legal description is attended by a certificate of an Illinois licensed land surveyor that the Improvements are all within the area described in the new description and that the description is accurate, all in a form acceptable to the City Engineer. Upon adoption of an ordinance, the City shall authorize the republication of this Ordinance with the initial Exhibit "A" relocated to Exhibit "E" which shall be a placeholder until this act and the new legal description shall be substituted in place of the original Exhibit "A." The republication of the Ordinance shall not affect or alter the December 6, 2010 approval of this WECS Permit and the republication is intended only to be a ministerial function of the City Council in order to accurately restrict the location of the WECS Permit that is hereby authorized.

9. Libman shall provide those materials required by Ordinance as part of its application for Building Permits for the wind tower for review by the City Engineer, City Attorney and approval

by the City Administrator based upon satisfaction of the conditions of this WECS Permit approval, provided, however, that these requirements may be waived by the City Administrator for cause. Libman shall provide at least the following as part of its application:

a. The property lines of the proposed site of the wind tower, including access road.
b. Proposed location of the wind tower, including distances from property lines as verified by a registered surveyor.
c. Location and description of all existing structures located within a radius equal to two (2) times the height of the proposed tower where the wind tower site is proposed.
d. Location of all above-ground utility lines within a radius equal to two (2) times the height of the proposed wind tower.
e. Location of all underground utility lines on the wind tower site.
f. Dimensional representation of the structural components of the tower construction including the base and footings.
g. Schematic of electrical systems associated with the wind tower including all existing and proposed electrical connections.
h. Manufacturer's specifications and installation and operation instructions or specific wind tower design information.
i. Certification by a registered professional engineer that the tower design is sufficient to withstand wind load requirements for structure as defined by ICC.
j. Location of all access roads required for the wind tower including necessary approvals from those with jurisdiction over roadways.
k. A topographical map of the proposed site of each wind tower including one-foot contour lines across the site and extending 100 feet in all directions from the limits of construction.
l. Proposed location of all easements necessary for the operation of the wind tower (executed copies of which shall be submitted prior to issuance of Certificate of Occupancy).
m. Other information as reasonably required by the City Administrator.

10. Each application for a Building Permit for a wind tower shall be accompanied by an application for Site Development Permit addressing stormwater management, drainage, soils, drain tiles, wetlands, waterways, ditches, etc., in accordance with the requirements of applicable laws and regulations.

11. Construction activity associated with the wind tower shall not commence before 6:00 a.m. nor continue past 9:00 p.m. on any day of the week, provided, however, that hoisting of wind energy conversion system components, and the preparing or repairing of cranes for work at wind turbine sites or on private access roads, shall be allowed without restriction as to hours of activity, and further provided that such construction activity after 9:00 p.m. shall be limited to not more than a total of ten (10) nights for the entire WECS project. Libman shall notify the City Administrator in every case where post-9:00 p.m. construction activities will take or have taken place. No cranes or other heavy equipment shall be permitted on, or permitted to cross, any City, County or Township road, and no excavating, trenching, foundation construction, tower construction, or underground cable installation, shall be allowed between the hours of 9:00 p.m. and 6:00 a.m.

12. Libman shall provide dust control measures as may be commercially and reasonably required by the City during construction, and shall repair any roads or other infrastructure damaged by construction or maintenance in accordance with the City Roads Agreement, and agreements, if any, approved by each Township and the County. In the discretion of the City Council, a multi-party agreement may be utilized for road purposes. Libman shall provide the City with copies of any licenses or easements pertaining to Libman's access from roads to the Property which pass over or through privately owned land. Any road or bridge damage caused by the transport of the WECS facility's equipment, as determined by the process set forth in the City Road Agreements, must be repaired per the terms of that Agreement. Furthermore, Libman shall provide security to insure that costs for future repairs to roads are completed to the commercially reasonable satisfaction of the unit of local government as outlined and in the amount determined by the Agreements.

13. Libman shall ensure that the facilities are properly decommissioned substantially in accordance with the plan marked at hearing as Exhibit 4B. Libman's obligations with respect to decommissioning are set forth only in the report (Exhibit 4A) and plan.

14. With respect to sound emissions from wind turbines, Libman shall comply with all applicable federal and State regulations, including the Illinois Pollution Control Board rules and regulations.

15. The WECS shall be comprised of new equipment that is commercially available. No used, refurbished, experimental or proto-type equipment still in testing before market release shall be approved by the City Administrator without his first making a report to the City Council.

16. All solid waste, whether generated from supplies, equipment, parts, packaging, or operation or maintenance of the WECS, including old parts and equipment, shall be removed from the site in a timely manner consistent with industry standards and the Code of Ordinances of the City of Arcola.

17. All hazardous waste generated by the operation and maintenance of the WECS, including but not limited to lubricating materials, shall be handled in a manner consistent with all local ordinances, and State and federal laws, rules and regulations.

18. Coatings and colorings of wind towers shall be a non-reflective, unobtrusive white or off-white color.

19. The project shall utilize minimal lighting. No tower lighting other than normal security lighting shall be permitted except as may be required by the Federal Aviation Administration (FAA).

20. If approved by the FAA, aviation warning light systems on the wind tower shall minimize ground level impacts and point-source of glare to the extent practicable through the use of such technology as Light Emitting Diode (LED) systems with internal light deflectors.

21. All new power lines used to collect power from individual turbines and all communication lines shall be trenched-in, except where they cross roads in which case they shall be bored as required in the Agreements, and located underground at a depth consistent with local utility and telecommunication underground lines standards unless located on public or utility rights of way with approval of the City Administrator. Prior to construction of the wind tower, access drives, surrounding gravel area, and access routes across farmland for construction vehicles and equipment, Libman shall investigate and identify existing drainage systems and drain tiles, and shall retain a qualified third-party drainage expert to be on site during construction of wind towers, access roads, electric power or communication systems and all related work. It shall be the responsibility of Libman to correct any and all drainage problems that occur as a consequence of this project. Libman will repair field tiles damaged by WECS construction and maintenance activities within two weeks of the date of receipt of notification, and will repair damage to other drainage facilities, including but not limited to waterways and drainage ditches, as soon as reasonably possible, but in any event within six (6) months of the date of receipt by Libman of notification.

22. An engineer's certificate shall be completed by an engineer registered in the State of Illinois and shall certify that the tower and foundation are compatible with and appropriate for the turbine to be installed and that the specific soils at the site can support the apparatus and such certificate shall accompany the Building Permit application. The wind turbine must utilize self-supporting, tubular towers with an internal ladder and locked door and a sign shall be placed on the tower stating "Warning Electrical Shock Hazard. No unauthorized person on tower. No Trespassing".

23. Libman shall provide information on underground utilities it constructs as part of the WECS to the "One-Call System" operated by the Joint Utility Locating Information for Excavators company, commonly known as JULIE.

24. Libman shall construct the project and the wind towers in substantial accordance with the following documents submitted as part of the public hearing, subject to modification so long as such modifications comply with the above conditions: Libman Exhibits 3A, 3B, 13AB, 13C and 20.

25. Libman shall establish a 24-hour "complaint hot line" telephone number and response service prior to and throughout construction and the operating life of the WECS and make such available to the City Administrator, police, sheriff and emergency responders. Disputes as to complaints and resolution of complaints shall be resolved per Condition #26 below.

26. In the event a dispute arises as to satisfaction of the Conditions to this WECS Permit Ordinance, such dispute may, at the request of Libman, the City, or a third aggrieved party provided such third party grievance is sponsored by the City or Libman, be resolved pursuant to binding arbitration in accordance with the procedures of the American Arbitration Association in either Arcola or Champaign by an independent arbitrator acceptable to Libman and the City, as applicable. If Libman and the City are unable to agree on an arbitrator, then each such party shall choose an independent arbitrator and their respective choices shall then choose an arbitrator. This condition shall not bind an aggrieved party, other than the City or Libman, to submit to arbitration.

27. This WECS Permit may be transferred by Libman only upon the transferee's execution and delivery to the City Administrator of a letter agreeing to be bound by the foregoing conditions.

Libman Equipment, LLC, and The Libman Company hereby accept the terms and conditions set forth in this Exhibit "C".

LIBMAN EQUIPMENT, LLC	THE LIBMAN COMPANY
By ______________________________	By ______________________________
Its: ______________________________	Its: ______________________________
Attest: ___________________________	Attest: ___________________________
Its: ______________________________	Its: ______________________________
Dated: ___________________________	Dated: ___________________________

EXHIBIT “D”
FINDINGS OF FACT AND DECISION

EXHIBIT "E"
LEGAL DESCRIPTION (FORMERLY ORIGINAL EXHIBIT A)
[PLACEHOLDER]

Attachment D-20
Libman Wind Energy Project Proforma 62m,85m,100m

Project Assumptions

Project Name		**Libman 1.5MW 62m**
Turbine		Vensys 1.5 62m tower
Number of turbines		1
Project Size in MW		1.5
Capacity Factor		23%
per turbine production (kwhr)		3,022,200
Annual Production (kWh)		3,022,200
Power Purchase Rate ($/kWh)	$	0.058
Green Tag Revenues ($/kWh)	$	0.000
Project Cost	$	3,208,000
Equity		
DCEO grant	$	500,000
DOE Grant	$	866,160
Equity Investor Contribution	$	1,241,840
Financing		
Total Equity	$	2,608,000
Term Debt	$	600,000
Debt Term in Years		10
Interest Rate		6.00%
Total Cash Payments (to Equity Investor)	$	0
Monthly Debt Payment	$	6,661.23
Per Yr Debt Payment	$	79,935
Ratios		
Tax Rate for Capital		35.15%
O & M Rate (% of revenues)		15.2%
Capital Cost per kWhr	$	1.06
Amortized IRR - 10 yr		0.77%
Amortized IRR - Equity Investor		9.38%
Debt Coverage Ratio (ave yrs 1-10)		1.20

Turbine Costs	
Turbine, Tower and Blades	$2,220,000
Delivery to Site-	$75,000
IL sales tax	$0
pad mount transformer	$45,000
Engineering- Civil and Electrical	$50,000
Met tower	$26,000
Electrical- Underground etc	$55,000
Interconnect-per turbine price	$95,000
Roads	$77,000
Foundations	$244,000
Erection	$230,000
Electrical completion of turbine	$40,000
project mgmt, legal	$43,000
FAA Lighting	$8,000
TOTAL	**$3,208,000**

Libman 1.5MW 85m Pro Forma

	1	2	3	4	5	6	7	8	9	10	11	12	13
REVENUES	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020	2021	2022
kWh/yr [1]	3,022,200	3,022,200	3,022,200	3,022,200	3,022,200	3,022,200	3,022,200	3,022,200	3,022,200	3,022,200	2,991,978	2,962,058	2,932,438
Energy Rate ($/kWh)	0.0580	0.0580	0.0580	0.0580	0.0592	0.0603	0.0616	0.0628	0.0640	0.0653	0.0666	0.0680	0.0693
Electric Savings	175,288	175,288	175,288	175,288	178,793	182,369	186,017	189,737	193,532	197,402	199,337	201,290	203,263
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**175,288**	**175,288**	**175,288**	**175,288**	**178,793**	**182,369**	**186,017**	**189,737**	**193,532**	**197,402**	**199,337**	**201,290**	**203,263**
EXPENSES													
Operation/Maintenance - Local [2]	1,500	1,530	1,561	1,592	1,624	1,656	1,689	1,723	1,757	1,793	1,828	1,865	1,902
Operation/Maintenance - T&M	0	0	26,000	26,520	27,050	27,591	28,143	28,706	29,280	29,866	30,463	31,072	31,694
Electrical Usage	800	816	832	849	866	883	901	919	937	956	975	995	1,015
Insurance [3]	10,500	10,710	10,924	11,143	11,366	11,593	11,825	12,061	12,302	12,548	12,799	13,055	13,317
Payments in Lieu of Property Tax 3	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Easement Payments	2,000	2,040	2,081	2,122	2,165	2,208	2,252	2,297	2,343	2,390	2,438	2,487	2,536
Admin/Financial Management [3]	2,000	2,040	2,081	2,122	2,165	2,208	2,252	2,297	2,343	2,390	2,438	2,487	2,536
Repairs Reserve	25,000	25,500	26,010	26,530	27,061	27,602	28,154	28,717	29,291	29,877	30,475	31,084	31,706
Decommissioning Contingency	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000
Total Expenses - Annual	46,800	47,636	74,489	75,878	77,296	78,742	80,217	81,721	83,256	84,821	91,417	93,045	94,706
Debt Service Payment	79,935	79,935	79,935	79,935	79,935	79,935	79,935	79,935	79,935	79,935			
Total Operating Expenses	126,735	127,571	154,423	155,813	157,231	158,677	160,152	161,656	163,190	164,755	91,417	93,045	94,706
Net Cash(per Annual Cash Reserve)	48,553	47,717	20,864	19,474	21,563	23,692	25,865	28,081	30,341	32,647	107,920	108,245	108,557
DEBT COVERAGE													
Accumulating Gross Reserves	48,553	97,241	121,022	144,127	170,013	198,806	230,636	265,636	303,946	345,711	469,002	596,317	727,763
Accumulating Net Reserve	48,553	97,241	120,050	141,925	166,326	193,345	223,077	255,619	291,073	329,542	444,052	561,178	680,958
Debt Coverage Ratio	1.38	1.37	1.14	1.12	1.14	1.15	1.16	1.17	1.19	1.20			
Average Coverage Ratio(Yrs 1-10)	1.20												
EQUITY PROVIDER AFTER TAX BASIS													
Federal PTC Value	0	0	0	0	0	0	0	0	0	0			
Depreciation Value (35%)	195,077	312,123	187,274	112,364	112,364	56,182	0	0	0	0			
Income Tax	?	?	?	?	?	?	?	?	?	?			
Total Tax Value	**195,077**	**312,123**	**187,274**	**112,364**	**112,364**	**56,182**	**0**	**0**	**0**	**0**			
Tax and Revenue Total	**243,630**	**359,840**	**208,138**	**131,839**	**133,927**	**79,875**	**25,865**	**28,081**	**30,341**	**32,647**	**107,920**	**108,245**	**108,557**

Notes:

1 Decreases 1% per annum beginning year 11

2 Increases 2% per annum

3 Assumed payment for community benefit

Project Proforma

14	15	16	17	18	19	20		
2023	2024	2025	2026	2027	2028	2029		
2,903,113	2,874,082	2,845,341	2,816,888	2,788,719	2,760,832	2,733,224		
0.0707	0.0721	0.0736	0.0750	0.0765	0.0781	0.0796		
205,255	207,266	209,298	211,349	213,420	215,512	217,624		
0.000	0.000	0.000	0.000	0.000	0.000	0.000		
0	0	0	0	0	0	0		
205,255	**207,266**	**209,298**	**211,349**	**213,420**	**215,512**	**217,624**		
1,940	1,979	2,019	2,059	2,100	2,142	2,185		
32,328	32,974	33,634	34,306	34,993	35,692	36,406		
1,035	1,056	1,077	1,098	1,120	1,143	1,165		
13,583	13,855	14,132	14,414	14,703	14,997	15,297		
5,000	5,000	5,000	5,000	5,000	5,000	5,000	0	0
2,587	2,639	2,692	2,746	2,800	2,856	2,914		
2,587	2,639	2,692	2,746	2,800	2,856	2,914		
32,340	32,987	33,647	34,320	35,006	35,706	36,420		
5,000	5,000	5,000	5,000	5,000	5,000	5,000		
96,400	98,128	99,891	101,689	103,523	105,393	107,301		
96,400	98,128	99,891	101,689	103,523	105,393	107,301		
108,854	109,138	109,407	109,660	109,897	110,118	110,323		
863,451	1,003,492	1,148,004	1,297,104	1,450,914	1,609,560	1,773,169		
803,432	928,638	1,056,618	1,187,410	1,321,056	1,457,595	1,597,070		
108,854	**109,138**	**109,407**	**109,660**	**109,897**	**110,118**	**110,323**		

Notes:

1 Decreases 1% per annum beginning year 11
2 Increases 2% per annum
3 Assumed payment for community benefit

Federal Bonus Depreciation as Applied to MACRS-GDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Basis		$ 2,774,920						
First Year BonusDeprec.	0%	0						
Reduced Basis		2,774,920	2,774,920	2,774,920	2,774,920	2,774,920	2,774,920	
Year 1 -- MACRS	20%	554,984						
Year 2 -- MACRS	32%		887,974					
Year 3 -- MACRS	19.2%			532,785				
Year 4 -- MACRS	11.52%				319,671			
Year 5 -- MACRS	11.52%					319,671		
Year 6 -- MACRS	5.76%						159,835	
Total Depreciation		554,984	887,974	532,785	319,671	319,671	159,835	**2,774,920**
								971,222

Internal Rate of Return - Project

	Initial Cash		$ 1,241,840	
	Years		10	

Yr. No.	Year	Cash out	Cash	IRR
1	2011	1,241,840	$ (1,241,840)	-
1	2011	-	243,630	
2	2012	-	359,840	
3	2013	-	208,138	
4	2014	-	131,839	
5	2015	-	$ 133,927	
6	2016	-	$ 79,875	-
7	2017	-	$ 25,865	-
8	2018	-	$ 28,081	-
9	2019		$ 30,341	
10	2020		$ 32,647	
			$ 1,274,182	**0.77%**

Internal Rate of Return - Equity Investor

	Initial Cash		$ 1,241,840	
	Years		20	

Yr. No.	Year	Cash out	Cash	IRR
1	2011	1,241,840	$ (1,241,840)	-
1	2011	-	243,630	
2	2012	-	359,840	
3	2013	-	208,138	
4	2014	-	131,839	
5	2015	-	133,927	
6	2016	-	79,875	-
7	2017	-	25,865	-
8	2018	-	28,081	-
9	2019		30,341	
10	2020		32,647	
11	2021		107,920	
12	2022		108,245	
13	2023		108,557	
14	2024		108,854	
15	2025		109,138	
16	2026		109,407	
17	2027		109,660	
18	2028		109,897	
19	2029		110,118	
20	2030		110,323	
			$ 2,366,300	**9.38%**

Project Assumptions

Project Name		**Libman 1.5MW 85m**
Turbine		Vensys 1.5 85m tower
Number of turbines		1
Project Size in MW		1.5
Capacity Factor		31%
per turbine production (kwhr)		4,033,980
Annual Production (kWh)		4,033,980
Power Purchase Rate ($/kWh)	$	0.058
Green Tag Revenues ($/kWh)	$	0.000
Project Cost	$	3,508,000
Equity		
DCEO grant	$	500,000
DOE Grant	$	947,160
Equity Investor Contribution	$	1,060,840
Financing		
Total Equity	$	2,508,000
Term Debt	$	1,000,000
Debt Term in Years		10
Interest Rate		6.00%
Total Cash Payments (to Equity Investor)	$	0
Monthly Debt Payment	$	11,102.05
Per Yr Debt Payment	$	133,225
Ratios		
Tax Rate for Capital		35.15%
O & M Rate (% of revenues)		11.4%
Capital Cost per kWhr	$	0.87
Amortized IRR - 10 yr		9.99%
Amortized IRR - Equity Investor		16.96%
Debt Coverage Ratio (ave yrs 1-10)		1.19

Turbine Costs	
Turbine, Tower and Blades	$2,420,000
Delivery to Site-	$75,000
IL sales tax	$0
pad mount transformer	$45,000
Engineering- Civil and Electrical	$50,000
Met tower	$26,000
Electrical- Underground etc	$55,000
Interconnect-per turbine price	$95,000
Roads	$77,000
Foundations	$294,000
Erection	$280,000
Electrical completion of turbine	$40,000
project mgmt, legal	$43,000
FAA Lighting	$8,000
TOTAL	**$3,508,000**

Project Proforma

Libman 1.5MW 85m Pro Forma

	1	2	3	4	5	6	7	8	9	10	11	12	13
REVENUES	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020	2021	2022
kWh/yr [1]	4,033,980	4,033,980	4,033,980	4,033,980	4,033,980	4,033,980	4,033,980	4,033,980	4,033,980	4,033,980	3,993,640	3,953,704	3,914,167
Energy Rate ($/kWh)	0.0580	0.0580	0.0580	0.0580	0.0592	0.0603	0.0616	0.0628	0.0640	0.0653	0.0666	0.0680	0.0693
Electric Savings	233,971	233,971	233,971	233,971	238,650	243,423	248,292	253,258	258,323	263,489	266,071	268,679	271,312
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**233,971**	**233,971**	**233,971**	**233,971**	**238,650**	**243,423**	**248,292**	**253,258**	**258,323**	**263,489**	**266,071**	**268,679**	**271,312**
EXPENSES													
Operation/Maintenance - Local [2]	1,500	1,530	1,561	1,592	1,624	1,656	1,689	1,723	1,757	1,793	1,828	1,865	1,902
Operation/Maintenance - T&M	0	0	26,000	26,520	27,050	27,591	28,143	28,706	29,280	29,866	30,463	31,072	31,694
Electrical Usage	800	816	832	849	866	883	901	919	937	956	975	995	1,015
Insurance [3]	10,500	10,710	10,924	11,143	11,366	11,593	11,825	12,061	12,302	12,548	12,799	13,055	13,317
Payments in Lieu of Property Tax 3	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Easement Payments	2,000	2,040	2,081	2,122	2,165	2,208	2,252	2,297	2,343	2,390	2,438	2,487	2,536
Admin/Financial Management [3]	2,000	2,040	2,081	2,122	2,165	2,208	2,252	2,297	2,343	2,390	2,438	2,487	2,536
Repairs Reserve	25,000	25,500	26,010	26,530	27,061	27,602	28,154	28,717	29,291	29,877	30,475	31,084	31,706
Decommissioning Contingency	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000
Total Expenses - Annual	46,800	47,636	74,489	75,878	77,296	78,742	80,217	81,721	83,256	84,821	91,417	93,045	94,706
Debt Service Payment	133,225	133,225	133,225	133,225	133,225	133,225	133,225	133,225	133,225	133,225			
Total Operating Expenses	180,025	180,861	207,713	209,103	210,521	211,967	213,441	214,946	216,480	218,045	91,417	93,045	94,706
Net Cash(per Annual Cash Reserve)	53,946	53,110	26,258	24,868	28,130	31,457	34,850	38,312	41,843	45,444	174,654	175,633	176,606
DEBT COVERAGE													
Accumulating Gross Reserves	53,946	108,135	137,637	166,634	199,762	237,212	279,179	325,866	377,484	434,253	626,935	826,376	1,032,773
Accumulating Net Reserve	53,946	108,135	136,556	164,154	195,567	230,935	270,404	314,124	362,249	414,938	597,891	785,482	977,797
Debt Coverage Ratio	1.30	1.29	1.13	1.12	1.13	1.15	1.16	1.18	1.19	1.21			
Average Coverage Ratio(Yrs 1-10)	1.19												
EQUITY PROVIDER AFTER TAX BASIS													
Federal PTC Value	0	0	0	0	0	0	0	0	0	0			
Depreciation Value (35%)	213,320	341,312	204,787	122,872	122,872	61,436	0	0	0	0			
Income Tax	?	?	?	?	?	?	?	?	?	?			
Total Tax Value	**213,320**	**341,312**	**204,787**	**122,872**	**122,872**	**61,436**	**0**	**0**	**0**	**0**			
Tax and Revenue Total	**267,266**	**394,422**	**231,044**	**147,740**	**151,002**	**92,893**	**34,850**	**38,312**	**41,843**	**45,444**	**174,654**	**175,633**	**176,606**

Notes:

1 Decreases 1% per annum beginning year 11
2 Increases 2% per annum
3 Assumed payment for community benefit

Project Proforma

14	15	16	17	18	19	20		
2023	2024	2025	2026	2027	2028	2029		
3,875,025	3,836,275	3,797,912	3,759,933	3,722,334	3,685,110	3,648,259		
0.0707	0.0721	0.0736	0.0750	0.0765	0.0781	0.0796		
273,971	276,656	279,367	282,105	284,869	287,661	290,480		
0.000	0.000	0.000	0.000	0.000	0.000	0.000		
0	0	0	0	0	0	0		
273,971	**276,656**	**279,367**	**282,105**	**284,869**	**287,661**	**290,480**		
1,940	1,979	2,019	2,059	2,100	2,142	2,185		
32,328	32,974	33,634	34,306	34,993	35,692	36,406		
1,035	1,056	1,077	1,098	1,120	1,143	1,165		
13,583	13,855	14,132	14,414	14,703	14,997	15,297		
5,000	5,000	5,000	5,000	5,000	5,000	5,000	0	0
2,587	2,639	2,692	2,746	2,800	2,856	2,914		
2,587	2,639	2,692	2,746	2,800	2,856	2,914		
32,340	32,987	33,647	34,320	35,006	35,706	36,420		
5,000	5,000	5,000	5,000	5,000	5,000	5,000		
96,400	98,128	99,891	101,689	103,523	105,393	107,301		
96,400	98,128	99,891	101,689	103,523	105,393	107,301		
177,570	178,527	179,476	180,416	181,347	182,268	183,179		
1,246,326	1,467,243	1,695,736	1,932,024	2,176,332	2,428,890	2,689,935		
1,174,924	1,376,949	1,583,964	1,796,059	2,013,327	2,235,861	2,463,758		
177,570	**178,527**	**179,476**	**180,416**	**181,347**	**182,268**	**183,179**		

Notes:
1 Decreases 1% per annum beginning year 11
2 Increases 2% per annum
3 Assumed payment for community benefit

Federal Bonus Depreciation as Applied to MACRS-GDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Basis		$ 3,034,420						
First Year BonusDeprec.	0%	0						
Reduced Basis		3,034,420	3,034,420	3,034,420	3,034,420	3,034,420	3,034,420	
Year 1 -- MACRS	20%	606,884						
Year 2 -- MACRS	32%		971,014					
Year 3 -- MACRS	19.2%			582,609				
Year 4 -- MACRS	11.52%				349,565			
Year 5 -- MACRS	11.52%					349,565		
Year 6 -- MACRS	5.76%						174,783	
Total Depreciation		606,884	971,014	582,609	349,565	349,565	174,783	**3,034,420**
								1,062,047

Internal Rate of Return - Project

	Initial Cash		**$ 1,060,840**	
	Years		**10**	

Yr. No.	Year	Cash out	Cash	IRR
1	2011	1,060,840	$ (1,060,840)	-
1	2011	-	267,266	
2	2012	-	394,422	
3	2013	-	231,044	
4	2014	-	147,740	
5	2015	-	$ 151,002	
6	2016	-	$ 92,893	-
7	2017	-	$ 34,850	-
8	2018	-	$ 38,312	-
9	2019		$ 41,843	
10	2020		$ 45,444	
			$ 1,444,815	**9.99%**

Internal Rate of Return - Equity Investor

	Initial Cash		**$ 1,060,840**	
	Years		**20**	

Yr. No.	Year	Cash out	Cash	IRR
1	2011	1,060,840	$ (1,060,840)	-
1	2011	-	267,266	
2	2012	-	394,422	
3	2013	-	231,044	
4	2014	-	147,740	
5	2015	-	151,002	
6	2016	-	92,893	-
7	2017	-	34,850	-
8	2018	-	38,312	-
9	2019		41,843	
10	2020		45,444	
11	2021		174,654	
12	2022		175,633	
13	2023		176,606	
14	2024		177,570	
15	2025		178,527	
16	2026		179,476	
17	2027		180,416	
18	2028		181,347	
19	2029		182,268	
20	2030		183,179	
			$ 3,234,491	**16.96%**

Project Assumptions

Project Name	Libman 1.5MW 100m
Turbine	Vensys 1.5 100m tower
Number of turbines	1
Project Size in MW	1.5
Capacity Factor	33.5%
per turbine production (kwhr)	4,401,900
Annual Production (kWh)	4,401,900
Power Purchase Rate ($/kWh)	$ 0.058
Green Tag Revenues ($/kWh)	$ 0.000
Project Cost	$ 3,914,000

Equity	
DCEO grant	$ 300,000
DOE Grant	$ 1,056,780
Equity Investor Contribution	$ 1,457,220

Financing	
Total Equity	$ 2,814,000
Term Debt	$ 1,100,000
Debt Term in Years	10
Interest Rate	6.00%
Total Cash Payments (to Equity Investor)	$ 0
Monthly Debt Payment	$ 12,212.26
Per Yr Debt Payment	$ 146,547

Ratios	
Tax Rate for Capital	35.15%
O & M Rate (% of revenues)	10.4%
Capital Cost per kWhr	$ 0.89
Amortized IRR - 10 yr	3.80%
Amortized IRR - Equity Investor	12.76%
Debt Coverage Ratio (ave yrs 1-10)	1.22

Turbine Costs	
Turbine, Tower and Blades	$2,680,000
Delivery to Site-	$75,000
IL sales tax	$0
pad mount transformer	$45,000
Engineering- Civil and Electrical	$50,000
met tower	$26,000
Electrical- Underground etc	$55,000
Interconnect-per turbine price	$95,000
Roads	$77,000
Foundations	$350,000
Erection	$370,000
Electrical completion of turbine	$40,000
project mgmt, legal	$43,000
FAA Lighting	$8,000
TOTAL	**$3,914,000**

Project Proforma

Libman 1.5MW 100m Pro Forma

	1	2	3	4	5	6	7	8	9	10	11	12	13
REVENUES	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020	2021	2022
kWh/yr [1]	4,401,900	4,401,900	4,401,900	4,401,900	4,401,900	4,401,900	4,401,900	4,401,900	4,401,900	4,401,900	4,357,881	4,314,302	4,271,159
Energy Rate ($/kWh)	0.0580	0.0580	0.0580	0.0580	0.0592	0.0603	0.0616	0.0628	0.0640	0.0653	0.0666	0.0680	0.0693
Electric Savings	255,310	255,310	255,310	255,310	260,416	265,625	270,937	276,356	281,883	287,521	290,338	293,184	296,057
Green Tags	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Savings-Annual	**255,310**	**255,310**	**255,310**	**255,310**	**260,416**	**265,625**	**270,937**	**276,356**	**281,883**	**287,521**	**290,338**	**293,184**	**296,057**
EXPENSES													
Operation/Maintenance - Local [2]	1,500	1,530	1,561	1,592	1,624	1,656	1,689	1,723	1,757	1,793	1,828	1,865	1,902
Operation/Maintenance - T&M	0	0	26,000	26,520	27,050	27,591	28,143	28,706	29,280	29,866	30,463	31,072	31,694
Electrical Usage	800	816	832	849	866	883	901	919	937	956	975	995	1,015
Insurance [3]	10,500	10,710	10,924	11,143	11,366	11,593	11,825	12,061	12,302	12,548	12,799	13,055	13,317
Payments in Lieu of Property Tax 3	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Easement Payments	2,000	2,040	2,081	2,122	2,165	2,208	2,252	2,297	2,343	2,390	2,438	2,487	2,536
Admin/Financial Management [3]	2,000	2,040	2,081	2,122	2,165	2,208	2,252	2,297	2,343	2,390	2,438	2,487	2,536
Repairs Reserve	25,000	25,500	26,010	26,530	27,061	27,602	28,154	28,717	29,291	29,877	30,475	31,084	31,706
Decommissioning Contingency	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000
Total Expenses - Annual	46,800	47,636	74,489	75,878	77,296	78,742	80,217	81,721	83,256	84,821	91,417	93,045	94,706
Debt Service Payment	146,547	146,547	146,547	146,547	146,547	146,547	146,547	146,547	146,547	146,547			
Total Operating Expenses	193,347	194,183	221,036	222,426	223,843	225,289	226,764	228,268	229,803	231,368	91,417	93,045	94,706
Net Cash(per Annual Cash Reserve)	61,963	61,127	34,274	32,885	36,573	40,336	44,173	48,088	52,080	56,153	198,921	200,138	201,351
DEBT COVERAGE													
Accumulating Gross Reserves	61,963	124,330	162,334	200,088	242,664	290,280	343,162	401,544	465,671	535,794	755,789	983,601	1,219,460
Accumulating Net Reserve	61,963	124,330	161,091	197,197	237,714	282,804	332,634	387,374	447,202	512,299	721,466	936,034	1,156,105
Debt Coverage Ratio	1.32	1.31	1.16	1.15	1.16	1.18	1.19	1.21	1.23	1.24			
Average Coverage Ratio(Yrs 1-10)	1.22												
EQUITY PROVIDER AFTER TAX BASIS													
Federal PTC Value	0	0	0	0	0	0	0	0	0	0			
Depreciation Value (35%)	238,008	380,813	228,488	137,093	137,093	68,546	0	0	0	0			
Income Tax	?	?	?	?	?	?	?	?	?	?			
Total Tax Value	**238,008**	**380,813**	**228,488**	**137,093**	**137,093**	**68,546**	**0**	**0**	**0**	**0**			
Tax and Revenue Total	**299,972**	**441,941**	**262,762**	**169,977**	**173,666**	**108,882**	**44,173**	**48,088**	**52,080**	**56,153**	**198,921**	**200,138**	**201,351**

Notes:

1 Decreases 1% per annum beginning year 11

2 Increases 2% per annum

3 Assumed payment for community benefit

Project Proforma

14	**15**	**16**	**17**	**18**	**19**	**20**						
2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**						
4,228,448	4,186,163	4,144,301	4,102,858	4,061,830	4,021,212	3,980,999						
0.0707	0.0721	0.0736	0.0750	0.0765	0.0781	0.0796						
298,958	301,888	304,847	307,834	310,851	313,897	316,973						
0.000	0.000	0.000	0.000	0.000	0.000	0.000						
0	0	0	0	0	0	0						
298,958	**301,888**	**304,847**	**307,834**	**310,851**	**313,897**	**316,973**						
1,940	1,979	2,019	2,059	2,100	2,142	2,185						
32,328	32,974	33,634	34,306	34,993	35,692	36,406						
1,035	1,056	1,077	1,098	1,120	1,143	1,165						
13,583	13,855	14,132	14,414	14,703	14,997	15,297						
5,000	5,000	5,000	5,000	5,000	5,000	5,000					0	0
2,587	2,639	2,692	2,746	2,800	2,856	2,914						
2,587	2,639	2,692	2,746	2,800	2,856	2,914						
32,340	32,987	33,647	34,320	35,006	35,706	36,420						
5,000	5,000	5,000	5,000	5,000	5,000	5,000						
96,400	98,128	99,891	101,689	103,523	105,393	107,301						
96,400	98,128	99,891	101,689	103,523	105,393	107,301						
202,558	203,760	204,956	206,145	207,328	208,504	209,672						
1,463,602	1,716,269	1,977,713	2,248,190	2,527,964	2,817,307	3,116,498						
1,381,785	1,613,181	1,850,400	2,093,553	2,342,752	2,598,111	2,859,746						
202,558	**203,760**	**204,956**	**206,145**	**207,328**	**208,504**	**209,672**						

Notes:

1 Decreases 1% per annum beginning year 11

2 Increases 2% per annum

3 Assumed payment for community benefit

Federal Bonus Depreciation as Applied to MACRS-GDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Basis		$3,385,61						
First Year BonusDeprec.	0%	0						
Reduced Basis		3,385,610	3,385,610	3,385,610	3,385,610	3,385,610	3,385,610	
Year 1 -- MACRS	20%	677,122						
Year 2 -- MACRS	32%		1,083,395					
Year 3 -- MACRS	19.2%			650,037				
Year 4 -- MACRS	11.52%				390,022			
Year 5 -- MACRS	11.52%					390,022		
Year 6 -- MACRS	5.76%						195,011	
Total Depreciation		677,122	1,083,395	650,037	390,022	390,022	195,011	**3,385,610**
								1,184,964

Internal Rate of Return - Project

	Initial Cash		$ 1,457,220	
	Years		10	

Yr. No.	Year	Cash out	Cash	IRR
1	2011	1,457,220	$ (1,457,220)	-
1	2011	-	299,972	
2	2012	-	441,941	
3	2013	-	262,762	
4	2014	-	169,977	
5	2015	-	$ 173,666	
6	2016	-	$ 108,882	-
7	2017	-	$ 44,173	-
8	2018	-	$ 48,088	-
9	2019		$ 52,080	
10	2020		$ 56,153	
			$ 1,657,695	**3.80%**

Internal Rate of Return - Equity Investor

	Initial Cash		$ 1,457,220	
	Years		20	

Yr. No.	Year	Cash out	Cash	IRR
1	2011	1,457,220	$ (1,457,220)	-
1	2011	-	299,972	
2	2012	-	441,941	
3	2013	-	262,762	
4	2014	-	169,977	
5	2015	-	173,666	
6	2016	-	108,882	-
7	2017	-	44,173	-
8	2018	-	48,088	-
9	2019		52,080	
10	2020		56,153	
11	2021		198,921	
12	2022		200,138	
13	2023		201,351	
14	2024		202,558	
15	2025		203,760	
16	2026		204,956	
17	2027		206,145	
18	2028		207,328	
19	2029		208,504	
20	2030		209,672	
			$ 3,701,028	**12.76%**

Attachment D-21

Representative Specifications of a Shadow Impact Control Product

Shadow Impact Module
Version 3
Quick Information

NorthTec GmbH

WINDTEST
Kaiser-Wilhelm-Koog GmbH

Shadow Impact

During sunny times of the day, the operation of wind turbine generators (WTG) may cause annoying periodic shadow impact to adjacent buildings. For this reason, building permits for the erection of WTGs increasingly demand the integration of automatic shut-down devices in order to prevent adjacent buildings from being impacted more than acceptable according to the recommended values. The shadow impact module introduced herein serves as a technical solution for meeting these demands.

Functionality

The light sensor of the shadow impact module periodically measures the intensity of the sun's visible radiation. Using the results, the module determines whether the intensity of the visible direct sun radiation is capable of causing shadow impact. At the same time, the shadow impact module calculates whether shadow impact occurs in a place of immission. In case the intensity of the direct sun radiation is capable of causing shadow impact and shadow impact is detected in a place of immission, the counters for daily and annual shadow impact are updated in cycles of 1 minute. If one of the limit values set is exceeded in this place of immission , the WTG responsible is shut down for the duration of the shadow impact. Because the calculations require the exact time, the shadow impact module is equiped with a radio controlled clock.

Planing Information

One shadow impact module can control the shadow impact of up to fifty WTGs in up to 100 places of immission and log the information of a full year. When limit values are exceeded, up to 12 WTGs can be shut down. In cases where more than 12 WTGs may need to be shut down, several shadow impact modules can be operated in parallel. A telecommunication cable or optical waveguide network existing on the wind farm can be used to control the WTG. The radiation sensor and the radio controlled clock need to be connected electrically to the shadow impact module. Therefore, when erecting the WTG, provide for cabling from the outside to the inside of the WTG (e.g. through an empty conduit or an existing drilling hole in the tower).

Programming

For programming of the shadow impact module, the location coordinates (Gauss-Krueger) of the WTG and of the place of immission to be monitored are required (see Appendix A). Places of immission may be indicated by several walls and areas. Separate day and year limit values can be defined for each place of immission. All data may be adjusted to the current conditions using the keyboard at any time. Unauthorized access to the data can be avoided by setting a password.

<u>Note:</u>
A calendar specifying the shut-down times is not required.

Log Function (Optional)

The shadow impact module logs relevant shadow impact events over at least one year. Each log entry is assigned with a corresponding time stamp. The log data may be retrieved in the shadow memory software using the serial interface of the shadow impact module. Manipulating the logs is not possible.

Sound Option

The sound option of the shadow impact module enables shutting down the WTG for predefined periods of time. These periods which can be defined for each WTG individually may refer to certain days of the week or certain periods specified by date.

Installation

The shadow impact module is installed in the tower base of the WTG using upright consoles. The cabinet is powered by a 230 Volts AC Mains Power source. For each WTG to be controlled, there is a floating relay contact (normally closed contact/ normally open contact) available. The light sensor and the radio controlled clock are mounted directly to the outside of the tower using a stainless clamp causing absolutely no damage to the tower or its structure (Fig. 1). When positioning the radiation sensor, shadowing effects caused by obstacles such as tree rows or other WTGs must be avoided by all means.

Fig. 1: Sensor mounted to the tower of a WTG

Appendix A: Configuration Data

Example of a place of immission with a relevant house wall and a patio area

General Data

Height above sea level: 45 m
Maximum duration of shadow impact per day: 30 min.
Maximum duration of shadow impact per year: 480 min.

Description of house wall

x-corner coordinate 1: 350 7685
y-corner coordinate 1: 597 4637
x-corner coordinate 2: 350 7695
y-corner coordinate 2: 597 4639
Height: 3 m
Orientation: South

Description of patio area

x-corner coordinate 1: 350 7685
y-corner coordinate 1: 597 4637
x-corner coordinate 2: 350 7690
y-corner coordinate 2: 597 4638
x-corner coordinate 3: 350 7692
y-corner coordinate 3: 597 4632
x-corner coordinate 4: 350 7687
y-corner coordinate 4: 597 4630

Example of a WTG

Hub height: 100 m
Rotor radius: 35 m
Height above sea level: 48 m
x-corner coordinate: 350 7745
y-corner coordinate: 597 4229

Appendix B: Example of a Log Sequence

1	04.02.2003	14.40.23	2	1	0 min	34 min	theoretical shadow impact
2	04.02.2003	14.45.29	2	1	0 min	34 min	shadow impact
3	04.02.2003	14.48.20	2	1	3 min	37 min	theoretical shadow impact
4	04.02.2003	14.50.54	2	1	3 min	37 min	shadow impact
5	04.02.2003	15.17.57	2	1	30 min	64 min	Stop WTG
7	04.02.2003	15.27.30	2	1	30 min	64 min	end of shadow impact
8	04.02.2003	15.28.44	2	1	30 min	64 min	Start WTG
9	04.02.2003	16.15.54	5	2	0 min	325 min	shadow impact
10	04.02.2003	16.22.32	5	2	6 min	331 min	end of shadow impact

Explanation:

PI: Place of Immission (building)
WTG: Wind Turbine Generator
Stop WTG: the corresponding WTG was shut down by the shadow impact module
Start WTG: the corresponding WTG was released
theoretical shadow impact: the corresponding WTG causes theoretical shadow impact in the corresponding PI but the direct sun radiation is not strong enough to cause real shadow impact
shadow impact: shadow impact actually occurs in the corresponding place of immission; the direct sun radiation is strong enough to cause real shadow impact

Shadow Impact Module Specifications

Operating temperature:	**-20°C … 50°C**
Protection class:	**IP 65**

Switch Cabinet with Module

Dimensions:	**500 x 500 x 310 mm (H x W x D)**
Weight:	**approx. 23 kg**
Supply voltage:	**230 V AC**
Max. power consumption:	**30 W**
Switch outputs:	**floating relay contacts (normally closed contact/ normally open contact), 12 max.**
Max. switching voltage:	**60 V/AC, 125 V/DC**
Max. switching capacity:	**62,5 VA / 30 W**

Radiation Sensor

Dimensions:	**80 x 65 x80 mm (H x W x D)**
Weight:	**approx. 11 kg (cantilever incl.)**
Cantilever length:	**1,5 m**
Supply voltage:	**15 V DC (power supply installed inside the cabinet)**

Radio controlled Clock

Dimensions:	**90 x 90 x50 mm (H x W x D)**
Weight:	**approx. 800g**
Supply voltage:	**15 V DC (power supply installed inside the cabinet)**

Development and Sales

WINDTEST Kaiser-Wilhelm-Koog GmbH

Sommerdeich 14 b

D-25709 Kaiser-Wilhelm-Koog

Tel: + 49 (0)4856 901 - 0

Fax: + 49 (0)4856 901 - 99

swm@windtest.de

Support, Installation, Maintenance and Location Survey

NorthTec GmbH

Horsbeker Weg 2

D-24980 Schafflund

Tel: + 49 (0)4639 782 046

Fax: + 49 (0)4639 782 3030

swm@northtec.org