DOE/EA 1807

FINAL
ENVIRONMENTAL ASSESSMENT

FOR

HEARTLAND COMMUNITY COLLEGE WIND ENERGY PROJECT

NORMAL, MCLEAN COUNTY, ILLINOIS

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

DECEMBER 2010

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COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

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ABSTRACT: DOE has provided a State Energy Program (SEP) grant to the State of Illinois and proposes to authorize the State to expend $500,000 of this Federal grant to assist with the financing of the design, permitting, and construction of the Heartland Community College (HCC) Wind Energy Project, a proposed 1.5-megawatt wind turbine on the northern end of the HCC campus, just south of Interstate 55, in Normal, 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 HCC, enabling it to reduce the electrical demands of the institution and lower the carbon footprint associated with daily operations. HCC has not finalized the selection of a manufacturer or wind turbine. Therefore, the analysis in this EA used specifications for one of the largest 1.5-megawatt models under consideration, the GE 1.5 MW XLE.

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

PUBLIC INVOLVEMENT: The public was provided with an opportunity to comment on the draft EA via email or written correspondence. Details regarding the comment process are included in Section 1.4 of this document. Public comments and responses are included in Appendix E.

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

ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
ARRA	*American Recovery and Reinvestment Act of 2009*
BBS	Breeding Bird Survey
BMP	best management practice
CFR	*Code of Federal Regulations*
dBA	Decibel on an A-weighted scale, used to approximate the human ear's response to sound
DCEO	(Illinois) Department of Commerce and Economic Opportunity
DOE	U.S. Department of Energy
DNL	Day Night Average Sound Level
EA	Environmental Assessment
EcoCAT	Ecological Compliance Assessment Tool
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GE	General Electric
GHG	Greenhouse Gas
HAARGIS	Historic Architectural and Archaeology Resources Geographic Information System
HCC	Heartland Community College
I-55	Interstate 55
IBA	Important Bird Area
IDNR	Illinois Department of Natural Resources
IHPA	Illinois Historic Preservation Agency
INHD	Illinois Natural Heritage Database
IPCB	Illinois Pollution Control Board
MBTA	*Migratory Bird Treaty Act*
NEPA	*National Environmental Policy Act*
NHPA	*National Historic Preservation Act*
NOA	Notice of Availability
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
OSHA	Occupational Safety and Health Administration
SEP	State Energy Program
SHPO	State Historic Preservation Office or Officer
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service

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1. INTRODUCTION

1.1 National Environmental Policy Act and Related Procedures

The *National Environmental Policy Act* (42 U.S.C. 4321 *et seq*.; NEPA), the Council on Environmental Quality NEPA regulations (40 CFR Parts 1500 to 1508), and the U.S. Department of Energy's (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 Environmental Assessment (EA):

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

DOE must meet these requirements before it can make a final decision to proceed with any proposed Federal action that could cause adverse impacts to human health or the environment. This EA provides DOE and other decision makers with the information needed to make an informed decision about the construction and operation of the proposed wind turbine. The EA evaluates the potential individual and cumulative impacts of the proposed project. For purposes of comparison, this EA also evaluates the impacts that could occur if DOE did not provide funding (the No-Action Alternative), under which DOE assumes that Heartland Community College (HCC) would not proceed with the project. No other action alternatives are analyzed.

1.2 Background

HCC proposes to construct, operate, and eventually decommission a single 1.5-megawatt wind turbine on the northern end of the HCC campus, just south of Interstate 55 (I-55), in Normal, Illinois (Appendix A- Figures 1 through 5). The proposed wind turbine would enable HCC to reduce electricity demands from the existing electrical source and lower its carbon footprint, as well as provide an opportunity for curriculum development and training for students interested in wind turbine operations and management. The current estimated project cost is approximately $3.2 million. The Illinois Department of Commerce and Economic Opportunity (DCEO) 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 DOE under the *American Recovery and Reinvestment Act of 2009* (Pub. L. 111-5, 123 Stat. 115; ARRA) and DOE's State Energy

Program (SEP). The purpose of the SEP is to promote the conservation of energy and reduce dependence on imported oil by helping states develop comprehensive energy programs and by providing them with technical and financial assistance.

States can use SEP funds for a wide variety of activities related to energy efficiency and renewable energy (see 42 U.S.C. 6321 *et seq*. and 10 CFR Part 420). In 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 HCC 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.

1.3 Purpose and Need

1.3.1 DOE'S PURPOSE AND NEED

DOE's purpose and need is to ensure that SEP funds are used for activities that meet congressional statutory aims to improve energy efficiency, reduce dependence on imported oil, decrease energy consumption, create and retain jobs and promote renewable energy. Providing funding as part of the Illinois SEP grant to HCC 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; and
- 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. However, it is not DOE's role to dictate to the DCEO how to allocate its funds among these objectives or to prescribe the projects it should pursue.

1.3.2 ILLINOIS' PURPOSE AND NEED

Illinois' purpose and need is to grow the economy of the state by connecting companies and communities to financial and technical resources to deploy renewable energy technologies, and to support the goals of SEP and 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.

1.3.3 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 includes four sub-programs:

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

The 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. HCC was one of the many renewable energy grant applicants to which the Office of Energy awarded SEP funds in 2009. Illinois has appropriated $500,000 to HCC. For this project, DOE is the Federal action agency, the Illinois Office of Energy is the recipient of Federal funding, and HCC is the sub-recipient of this funding. The project would be implemented on HCC property.

1.4 Public and Agency Involvement

1.4.1 SCOPING

When it began preparing this EA, DOE sent notices of public scoping to stakeholders and interested parties, including local, State, Tribal, and Federal agencies, organizations, and the general public to solicit comments. The notices were sent via postcard on July 16, 2010, directing the stakeholders to DOE's Golden Field Office's Public Reading Room (http://www.eere.energy.gov/golden/reading_room.aspx), where DOE published the scoping letter for review. The scoping letter described the DOE's Proposed Action and requested public comment regarding the Action and assistance in identifying potential issues that could be evaluated in the upcoming EA. The public comment period closed on July 30, 2010. DOE did not receive any comments during the scoping period. Appendix D-4 of this EA contains a copy of the scoping letter and stakeholder distribution list (discussed in Section 1.4.2).

The following agencies and organizations were contacted by HCC and/or DOE (see Section 9 of this EA):

- U.S. Fish and Wildlife Service (USFWS)
- Federal Aviation Administration (FAA)
- U.S. Department of Commerce – National Telecommunications and Information Administration (NTIA)
- U.S. Department of Agriculture
- Illinois Historic Preservation Agency (IHPA)

- Illinois Department of Natural Resources (IDNR), Division of Ecosystem and Environment
- DCEO
- Illinois Department of Transportation, Bureau of Operations Region 3/District 5
- Illinois Department of Military Affairs
- HCC Board of Trustees
- Town of Normal Office of the City Manager
- McLean County Building and Zoning Department

In addition, HCC consulted with the HCC Board of Trustees, the Town of Normal, and McLean County. The potential for a wind turbine on the HCC campus was presented at the HCC's Board of Trustees meetings of December 12, 2006, and February 20, 2007 (Appendix D-1). Section 9 of this EA contains additional information on agencies and persons consulted.

The project requires a construction permit from the Town of Normal. HCC anticipates the process to obtain the construction permit will begin in January 2011, with the permit granted in the spring of 2011.

The County of McLean does not require permits or planning approvals.

Pursuant to Section 7 of the *Endangered Species Act* and Section 106 of the *National Historic Preservation Act* (NHPA), DOE sent letters to USFWS and IHPA describing the proposed project and requesting information regarding Federally listed species and known historic or cultural resources in the area, respectively, that might be affected through implementation of the proposed project. Copies of the response letters are included in Appendix C.

1.4.2 DRAFT ENVIRONMENTAL ASSESSMENT

The draft EA was available for public comment for 15 days beginning with the publication of a Notice of Availability (NOA) in the *Pantagraph* on October 1, 2010, and on the HCC website (http://www.heartland.edu). The NOA was sent to potential stakeholders and interested parties (i.e., Federal, State, Tribal and local agencies, as well as members of the public). The NOA clearly identified the public's opportunity to comment on the proposed project's potential effects. In addition, DOE conducted a Section 106 consultation pursuant to the NHPA and provided an opportunity for the public to comment on that document in the same manner in which they could comment on the draft EA.

The draft EA was posted on the DOE NEPA Website (http://nepa.energy.gov), allowing the opportunity to comment online via email or written correspondence to the postal address provided therein. At the conclusion of the 15-day comment period (October 16, 2010), DOE analyzed all submitted comments and questions and considered each issue for inclusion in the final EA.

DOE received three comments on the draft EA. One comment complimented the thoroughness of the analysis and requested the appendices to complete the review. The second comment was from the Illinois EPA and expressed no objection to the project, but called out the potential requirement for HCC to obtain a construction site activity stormwater NPDES permit from the

Division of Water Pollution Control if one or more acre of land is disturbed during construction. The final comment letter was from the John Wesley Powell Audubon Society, identifying additional data sources DOE should consider in its biological resource analysis. The Audubon Society also requested cut-in speed modifications and that HCC monitor bird and bat mortality for one year after construction was completed. DOE revised Section 3.2.2.6 of this EA to address additional data sources, and to reflect HCC's agreement to voluntarily conduct post-construction monitoring for bat and bird mortality rates for the initial post-construction fall migration season. The section was also revised to include HCC's commitment to consider modification of the turbine's cut-in speed upon selection and evaluation of the specific turbine model. All comments received were incorporated into the EA appendices (see Public Comments and Responses in Appendix E).

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 HCC Wind Energy Project (proposed project), a 1.5-megawatt wind turbine on the northern end of the HCC campus, just south of I-55, in Normal, Illinois.

DOE has authorized DCEO to use a percentage of its Federal funding for preliminary activities, including the preparation of this EA and associated analyses. Such activities are associated with the proposed project and 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.

2.2 Illinois' Proposed Project

The DCEO selected HCC for a $500,000 grant based on the following criteria: project readiness; matching capabilities, financing, and cost effectiveness; economic impact for Illinois; project characteristics and potential for innovation. This section process also evaluated the project's ability to (1) provide emission-free energy; and (2) create jobs during the construction of the project. The project would be implemented on HCC's property in Normal, Illinois.

The project would involve the construction, operation, and eventual decommission of a single 1.5-megawatt wind turbine along with an approximate 183 meters (600 feet) permanent gravel access road and 366 meter (1,200 feet) underground electrical transmission line on the northern end of the HCC campus, located just south of I-55 in Normal, Illinois (Appendix A- Figures 1 through 5). The underground electrical transmission line would extend from the proposed turbine south to the college's Physical Plant Building electrical switchgear (Figure 5). The proposed wind turbine would enable the college to reduce electricity demands from the existing electrical source and lower its carbon footprint, as well as provide curriculum development and training for student interested in wind turbine operations and management.

2.2.1 PROJECT LOCATION

The proposed HCC wind turbine would be located at the northern end of campus approximately 244 meters (800 feet) south of I-55. HCC is located in the northwest corner of the Town of Normal, McLean County, Illinois (Figure 2-1 below and Appendix A- Figures 1 through 5). The HCC campus is approximately 160 acres and is bounded on the north by I-55, with agricultural land located further north of the interstate; to the south by W. Raab Road, with primarily agricultural land located further south; to the east by an I-55 off ramp and agricultural land; and to the west by additional agricultural land. The campus consists of nine buildings including the Student Commons, Community Commons, Instructional Commons and Instructional Commons North Buildings, the Workforce Development Center, Child Development Lab, Community Education Center, Receiving and Storage Building, and the Physical Plant Building (see Appendix A- Figure 5). A Fitness and Recreation Center is currently under construction and is to be located to the north of the Community Education Center. A Student Center addition is also under construction and is located at the north side of the Student Commons Building. The

buildings closest to the proposed turbine include the Receiving and Storage Building [approximately 140 meters (460 feet)] and the Child Development Lab [approximately 305 meters (1,000 feet)] as these buildings are located at the northern edge of the campus.

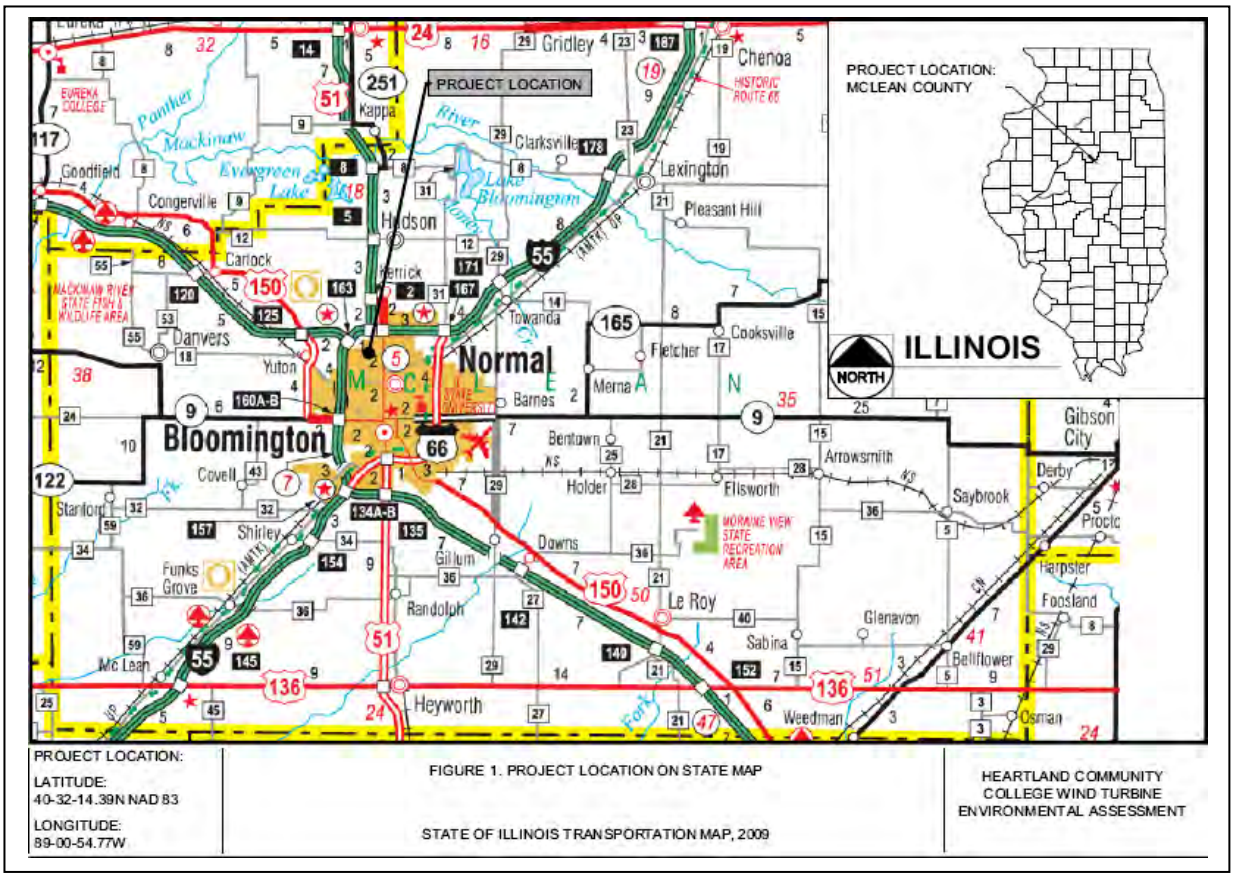

Figure 2-1. Project Location on State Map

A residential mobile home park is located approximately 1,250 meters (4,100 feet) east of the project site. Further to the southwest of the proposed turbine location are residential areas consisting of approximately three single-family residences north of W. Raab Road, and an apartment complex south of W. Raab Road. The homes and apartment complex are located approximately 564 meters (1,850 feet) and 610 meters (2,000 feet) south-southwest of the proposed turbine location, respectively. HCC acquired this property on October 29, 2010 (see section 3.2.2.1 of this EA for additional information related to land use).

The lot on which the project is proposed, and the HCC campus, is zoned S-2 Public Lands and Institutions District according to the Town of Normal Zoning Map (Town of Normal 2010) (see Appendix A- Figure 8). The project would be located on a site that has been previously disturbed (graded), currently consists of grass field, and is owned by HCC. The approximate center point of the proposed HCC wind turbine is 40 degrees north Latitude and 89 degrees west Longitude, approximately 140 meters (460 feet) north of the Receiving and Storage Building on the HCC campus.

2.2.2 CONSTRUCTION AND INSTALLATION

Site construction would include installation of a single wind turbine, underground distribution line, necessary access roads and road improvements, crane pad, foundation system, and fencing around the turbine base. The construction would be carried out in accordance with an approved storm water pollution prevention plan, associated National Pollutant Discharge Elimination System (NPDES) permit, and in compliance with all other applicable requirements and regulations. Construction would be located on land previously disturbed/graded and maintained by HCC. Turbine delivery is assessed in Section 3.2.2.8 of this EA.

The project would include an approximate 366 meter (1,200 feet) new underground electrical transmission line to connect the turbine to the college's Physical Plant Building electrical switchgear.

To adequately distribute the power from the turbine to the campus the following may be installed:

- Underground conduits
- Conduit trestle
- Rigid conduit
- 250 kcmil wire
- #2/0 ground wire
- 4,160-volt switchgear on concrete housekeeping pad
- Bus duct to interconnect into HCC's existing switchgear
- Production meter

The transformer and switch gear cubicle would be situated outside the wind turbine tower at the 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 approximately 183 meter (600 feet) permanent gravel access road would be constructed from the northern edge of the campus Parking Lot K to the proposed wind turbine location (Appendix A- Figure 5). Permanent fencing and warning signs indicating high voltage areas are planned to surround 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 may disturb more than one acre of land. Construction would be performed in accordance with an approved erosion and sedimentation control plan and in compliance with all other applicable

requirements. An NPDES permit would be acquired from the Illinois Environmental Protection Agency for protection of waterways. Construction activities for wind turbine foundations, 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 periods of calm wind. Foundations would not be installed during cold winter months. These factors are highly relevant to the installation schedule and would determine the final construction timeline.

The wind turbine construction, including site preparation, erection, final commissioning, generator installation, and overall systems tie-in and start-up is estimated to take at least 12 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 12-month period the site would be expected to see activity for approximately 5 months. Two months at the beginning of the 12-month period for excavation and foundation work, and three months at the end of the 12-month period for electrical work, tower erection, turbine and blade installation, and startup. The following breakdown is anticipated for the construction phase:

- Excavation – 2 weeks
- Foundation and reinforcing work – 8 weeks
- Electrical distribution (including directional boring for underground conduit, conduit trestle, in-plant conduit installation, and switchgear installation at existing switchgear room) – 12 weeks
- Tower erection – 1 week
- Turbine nacelle and blade installation – 2 weeks
- Electrical tie-in and interconnection – 2 weeks
- Turbine and system commissioning – 2 weeks
- Site cleanup and recreation facility restoration – 1 week

Construction also would entail occupying surrounding areas of the project within the privately owned HCC campus to serve as lay down areas for machinery, equipment, and supplies. During construction, the property would be closed and secured via temporary fencing and locked gates to prevent public access to the work zone. The field would be restored to its previous condition upon completion of construction activities.

Aviation Lighting

Lighting for aviation safety would be installed to comply with FAA requirements (FAA 2007). Red strobe lights would be used at the minimum number, minimum intensity, and minimum number of flashes per minute allowable by the FAA (Appendix D).

Operations and Maintenance

HCC would operate and maintain the wind turbine according to standard industry procedures and applicable requirements. All workers and students 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 that operations are proceeding efficiently. Any problems would be reported 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.

2.2.3 DECOMMISSIONING

The turbine and other infrastructure are expected to have a useful life of at least 20 years. The trend in the wind energy industry has been to "repower" older wind energy projects by upgrading equipment with more efficient turbines, thereby extending a project's useful life beyond 20 years. Upon reaching the expected operational life of the wind turbine, HCC 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, HCC would determine if the turbine would be replaced based on current day technologies.

Activities associated with the decommissioning of the project are expected to be similar in nature to the initial construction when the project is terminated and 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 0.9 meter (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, adding topsoil, and replanting of all disturbed areas with native species. 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

2.3 Alternatives

2.3.1 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.

In compliance with applicable statutes and regulations, this EA examines the potential environmental impacts of the DOE's Proposed Action (providing funding for the Proposed Project) and the No-Action Alternative. This EA also describes options that the Heartland Community College considered during development of its application to the State of Illinois, which is the recipient of SEP funding. This EA provides DOE with the information needed to make an informed decision about whether allowing the State of Illinois to pass through some of its Federal funds for the proposed project may result in significant environmental impacts. Based on this EA, DOE either will issue a Finding of No Significant Impact (FONSI), which may include mitigation measures, or determine that additional study is needed in the form of a more detailed environmental impact statement.

2.3.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, DOE would not allow Illinois to use its SEP funds for this project. DOE assumes for purposes of this 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, HCC 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.

2.3.3 ALTERNATIVES CONSIDERED BY THE PROJECT PROPONENT

In order to meet the goals of a reduced carbon footprint and energy cost savings, HCC considered the use of other renewable energy sources for power generation; however, the cost of the other technologies considered were determined to exceed the benefits. HCC conducted an analysis for the consideration of multiple turbines and developed criteria to be considered during siting in the October 2009 report *Wind Resource Analysis and Wind Turbine Recommendations* (Appendix D-2). While the GE 1.5 MW XLE was used for this analysis to represent the upper limit of associated impacts, the turbines listed below were evaluated in the October 2009 report:

- AAER A-1500-70177 Wind Turbine
- GE 1.5 MW SLE Wind Turbine
- Nordex N60 Wind Turbine
- Suzlon S66 Wind Turbine
- VESTAS V82 Wind Turbine

The turbines were evaluated under the following criteria:

- Mechanical System – rotor, blades, color and reflectivity, pitch control, nacelle, yaw control, drive train, suspension and bearings, tower, maintenance and serviceability, corrosion protection, mechanical system, rotor;

- Electrical System – principles of operation, standard/special configurations, integrated grid protection schemes, major components, generator type, converter (inverter), external electrical grounding, house load;

- Safety – International Standards for Wind Turbine Generating Systems class parameters, temperature range (operating and structural), general fail-safe, breaking, safety chain, equipment, lightning, fire; and

- Wind Turbine Control – control system and Supervisory Control and Data Acquisition cut-in and cut-out strategy, blade icing detection, strategies.

HCC's options for turbine siting were limited to the northern end of its campus due to a number of factors, including but not limited to setback requirements from I-55, wind velocities and wind direction, topography of land, feasibility of payment to land owners for use of their property,

planned development of the eastern wing of HCC campus, amount of ground disturbance needed for trenching the distribution line to the physical plant on HCC campus (Appendix A- Figure 5), and proximity to existing buildings and to the Town of Normal. The final project location was selected to ensure that existing parking lots, buildings, and publicly accessible roadways would not be located within the proposed turbine's fall zone. (Refer to Section 3.2.2.7 of this EA for further discussion on the fall zone.) During the NEPA process DOE determined that Parking Lot K and the Receiving and Storage Building (Appendix A- Figure 5) would have been located within the analyzed fall zone of the original turbine location. To eliminate any potential risk associated with having public access areas within the turbine's fall zone, HCC elected to relocate the turbine approximately 91 meters (300 feet) west-southwest of the original location. This updated location was used to conduct the analyses throughout this EA.

2.4 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 2-1. Documentation of all agency approvals received are provided in Appendix C of this EA.

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

Agency	Permit Approval / Type
Federal	
FAA	FAA Aeronautical Determination (received November 16, 2009, Appendix C-3; in process for new location)
NTIA	Radio Frequency Transmission Notification
USFWS	Compliance with the *Endangered Species Act*, the *Migratory Bird Treaty Act*, and the *Bald and Golden Eagle Protection Act*
State	
IHPA	Compliance with *National Historic Preservation Act of 1966* (as amended)
Illinois Environmental Protection Agency	National Pollutant Discharge Elimination System; filing the Notice of Intent for Construction Activities
IDNR	17 III. Adm. Code Part 1075 and 1090. State Threatened or Endangered Species consultation and natural resource review
Illinois Department of Transportation	Oversize/Overweight Vehicle (to be obtained by the trucking/delivery company)
Local	
Town of Normal	Construction Permit

2.5 Project Proponent-Committed Practices

HCC has committed to the following measures and procedures to minimize or avoid environmental impacts if the proposed project is carried forward.

2.5.1 BIRD, BAT, AND RAPTOR AVOIDANCE AND MINIMIZATION MEASURES

During turbine siting, HCC has and would continue to give 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 minimize 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 turbines. Guy wires can be a challenge for birds and bats to locate, which makes them difficult to maneuver around them and can lead to injury or death.

HCC has also reviewed and incorporated several of the BMPs from the USFWS Wind Turbine Guidelines Advisory Committee's Site Development and Construction BMPs (USFWS 2010a). Discussion of the applicable recommendations and actions are located within the "Direct and Indirect Impacts" section within Section 3.2.2.6 of this EA. HCC reviewed the May 2010 Bat Conservation International report, "Effectiveness of Changing Wind Turbine Cut-in Speed to Reduce Bat Fatalities at Wind Facilities" prepared for the Bats and Wind Energy Cooperative and the Pennsylvania Game Commission (BCI 2010a). Based on the findings of this report, HCC will consider increasing the turbine's cut-in speed during periods of known heavy bat migration (primarily during weather conditions favorable for migration during the period late August to October) after further evaluation of the specific turbine model chosen for the site.

HCC would conduct voluntary post-construction avian and bat mortality surveys. Voluntary monitoring would likely consist of an initial post-construction fall migration season (approximately 8-12 weeks, based predominantly on Indiana bat migration habits). HCC plans to implement the voluntary monitoring with in-kind support/oversight from HCC faculty/staff, or with faculty/staff support from nearby Illinois State University. This monitoring will provide data to the USFWS, DOE, and IDNR on potential avian and bat mortality associated with single wind turbines. DOE is working with USFWS Region 3 to establish an appropriate protocol for post-construction monitoring. The final protocol is expected to include details related to timing, frequency, and reporting. HCC would implement monitoring consistent with the final protocol.

2.5.2 CULTURAL AND HISTORIC RESOURCES

If archaeological resources were encountered during construction, ground-disturbing activities would immediately cease, and the IHPA would be contacted for resolution and further instruction regarding additional studies and/or potential avoidance, minimization, or mitigation measures in accordance with the NHPA.

2.5.3 HUMAN HEALTH AND SAFETY

The construction contractor and facility operator would prepare a health and safety plan per Occupational Safety and Health Administration (OSHA) requirements before commencing work. Facilities would be secured by fencing. The construction of the proposed Wind Energy Project would comply with all applicable Federal, State and local requirements. Facilities would be secured by fencing and signs warning of high-voltage areas would be installed.

2.5.4 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.

2.5.5 SOIL AND GEOLOGY

HCC would require its construction contractor to use best management practices (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.

2.5.6 WASTE MANAGEMENT

Any 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.

2.5.7 OPERATION AND MAINTENANCE

Because an exact model has not been selected, specific operation and maintenance procedures have not been determined; however, HCC would maintain the turbine to manufacturer specifications while incorporating BMPs. All workers and students 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 HCC 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.

2.5.8 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, HCC would work directly with the party to resolve those concerns.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This chapter of the EA examines in detail the potential environmental impacts of the proposed project and of 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.

Although, DOE EAs commonly address other resource and subject areas, this assessment did not examine some resource areas at a higher level of detail. The focus for the more-detailed analysis was on those activities or actions that DOE determined have the potential or perceived potential for significant adverse environmental impacts.

HCC has not yet selected the wind turbine model to be constructed; therefore, the analysis in this EA used specifications for one of the largest and loudest models under consideration, the GE 1.5 MW XLE (Appendix D-5). The height of the turbine's hub would be approximately 80 meters (262 feet) and the total height would be approximately 121 meters (397 feet) to the blade tip at its highest point. The proposed project would also include:

- An approximate 366 meter (1,200 feet) new underground electrical transmission line to connect the turbine to the college's Physical Plant Building electrical switchgear, and associated system components.

- An approximate 183 meter (600 feet) permanent gravel access road would be constructed from the northern edge of the campus Parking Lot K to the proposed wind turbine location.

- Permanent fencing to surround the turbine foundation.

3.1 No-Action Alternative

Under the No-Action Alternative, baseline conditions would continue pursuant to HCC's current plan of purchasing energy from Corn Belt Energy. If the HCC Wind Energy Project was not implemented, approximately 61 percent of HCC's average daily electrical power that could be provided by the project would continue to be purchased from Corn Belt Energy. Corn Belt Energy's power supplier, Wabash Valley Power Association, generates electricity and also purchases electricity from other utilities. According to the Corn Belt Energy website (http://www.cornbeltenergy.com/about-us/news-center/company-profile.html), the Wabash Valley Power Association obtains approximately 78 percent of its electricity from nonrenewable fossil fuel sources such as coal, petroleum, and natural gas (Corn Belt Energy 2010). Therefore, fossil fuels are currently the primary electricity source for the HCC. Thus, carbon dioxide emissions from generating electricity to serve HCC would be higher under the No-Action Alternative, and HCC would not meet its objective to reduce its carbon footprint.

The jobs created by construction and operation of the wind turbine would not be realized and the local area would forego the economic benefit associated with these new jobs. Additionally, the

opportunity for curriculum development and the proposed change to HCC's Applied Maintenance certificate program would not be realized.

3.2 Illinois' Proposed Project

3.2.1 CONSIDERATIONS NOT CARRIED FORWARD FOR 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 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.

3.2.1.2 Waste Management

Solid wastes anticipated to be generated during construction include equipment packaging materials and construction related material debris. Solid wastes generated during operation of the proposed turbine would be minimal. Solid wastes anticipated to be generated during decommissioning include dismantled equipment and construction related material debris. Hazardous and regulated nonhazardous 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.

3.2.1.3 Water Resources

3.2.1.3.1 Floodplains and Wetlands

Pursuant to 10 CFR Part 1022, DOE reviewed the IDNR Ecological Compliance Assessment Tool (EcoCAT) and the USFWS National Wetlands Inventory (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. The data consists of geospatial information and topical maps that show wetlands and deepwater habitats and can be used to determine if any wetlands in the vicinity of the proposed project. According to the IDNR EcoCAT, the Illinois Natural Heritage Database

(INHD) contains no record of 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 6.

The Federal Emergency Management Agency floodplain maps (FEMA 2005) were reviewed and no floodplains were identified on the proposed project site (Appendix A- Figure 7).

3.2.1.3.2 Ground and Surface Water

The Town of Normal provides water to HCC through the use of municipal wells, which are located greater than 305 meters (1,000 feet) from the proposed project location. According to the Illinois State Private Well Database, four private wells may be located within 609 meters (2,000 feet) to the southwest of the proposed turbine location. These private wells are likely associated with the residential homes currently located to the southwest of the site as shown in Appendix A- Figure 4.

In compliance with the *Clean Water Act*, the project site was investigated for surface water bodies. No ponds or streams occur in the immediate proposed project vicinity. Therefore, no surface waters would be impacted by the project. The nearest surface water body is a retention pond located approximately 609 meters (2,000 feet) southeast of the site. The nearest stream is Sugar Creek which is located greater than 4 km (2.5 miles) south of the turbine location.

Construction of the single turbine is not anticipated to have an adverse impact to surface, ground and drinking water resources in the project area. No runoff or discharges from the proposed project construction area would directly enter Sugar Creek. An NPDES permit would be acquired prior to any construction related earthwork. The construction would be carried out in accordance with an approved soil erosion and sedimentation control plan and the associated NPDES permit, and in compliance with all other applicable requirement, regulations, and sediment and erosion pollution control BMPs.

3.2.1.3.3 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 closest designated Wild and Scenic River is the Middle Fork of the Vermilion River, approximately 109 km (68 miles) southeast from the proposed project location.

3.2.2 CONSIDERATIONS CARRIED FORWARD FOR FURTHER ANALYSIS

3.2.2.1 Land Use

The proposed HCC wind turbine would be located at the northern end of the campus, approximately 244 meters (800 feet) south of I-55. HCC is located in the northwest corner of the Town of Normal, McLean County, Illinois (Appendix A- Figures 1 through 5). The land use

pattern in the vicinity of the proposed Wind Energy Project is institutional and agricultural. The Town of Normal has the project area zoned S-2 Public Lands and Institutions District (Appendix A- Figure 8). The property is bounded on the north by I-55 with agricultural land located further north of the interstate. To the south, the property is bounded by the HCC campus, with W. Raab Road and agricultural land located further south. Three single-family residences are located to the southwest of HCC's campus. This agricultural land (immediately to the west of the campus property) is under jurisdiction of McLean County and it is not within the limits of the Town of Normal. A residential mobile home park is located to the east of the property and approximately 1,250 meters (4,100 feet) east of the project site. While the mobile home park property is currently under residential use, it is zoned as a B-1 General Business District. The nearest residential areas include the three homes referenced above, located between approximately 564 and 716 meters (1,850 and 2,300 feet) southwest of the proposed turbine location, and an apartment complex located approximately 640 meters (2,100 feet) south-southwest of the proposed turbine location (Appendix A- Figure 4). The campus consists of nine buildings including the Student Commons, Community Commons, Instructional Commons and Instructional Commons North Buildings, the Workforce Development Center, Child Development Lab, Community Education Center, Receiving and Storage Building and the Physical Plant Building (Appendix A- Figure 5). A Fitness and Recreation Center is currently under construction and is to be located to the north of the Community Education Center. A Student Center addition is also under construction and is located at the north side of the Student Commons Building. The buildings closest to the proposed turbine include the Receiving and Storage Building and the Child Development Lab, as these buildings are located at the northern edge of the campus.

On September 21, 2010, under a willing seller agreement, the HCC Board of Trustees voted to purchase all land (approximately 96 acres) west of the campus's current western property line up to the I-55/I-74 interchange. The property was acquired on October 29, 2010. The purchase represented a strategic acquisition for future growth. Specific expansion plans do not exist at this time. There are three residential units on the property; two owner occupied and one rental. It is anticipated that the residents of the owner-occupied units would be allowed to remain in their homes for up to seven years; however, HCC would own these structures. It is also anticipated that the land currently used for agricultural purpose would continue to be leased for that purpose for the near future.

The center of the Town of Normal is located approximately 3.2 km (2 miles) southeast of the proposed wind turbine site, and the City of Bloomington is located approximately 6.08 km (3.8 miles) southeast (Figure 2-1). The Central Illinois Regional Airport at Bloomington-Normal is located approximately 8.8 km (5.5 miles) to the southeast of the proposed project. The predominant land use within a 1.6 km (1 mile) radius of the proposed project site is agricultural. Higher density residential development is present at distances greater than 1.6 km (1 mile) to the east, southeast, and south, while agricultural and open space dominate the landscape to the northeast, north, northwest, west, and southwest for more than 8 km (5 miles).

Direct and Indirect Impacts

Implementation of the proposed project would permanently commit 0.2 acre (8,712 square feet) and temporarily commit approximately 2 acres of previously disturbed land. The general land use of the area is and would continue to be institutional and agricultural. The area immediately

surrounding the proposed tower location would continue to be used for residential, mixed-use, and agricultural purposes. The proposed project would not result in any direct or indirect impacts or any irretrievable commitment of land.

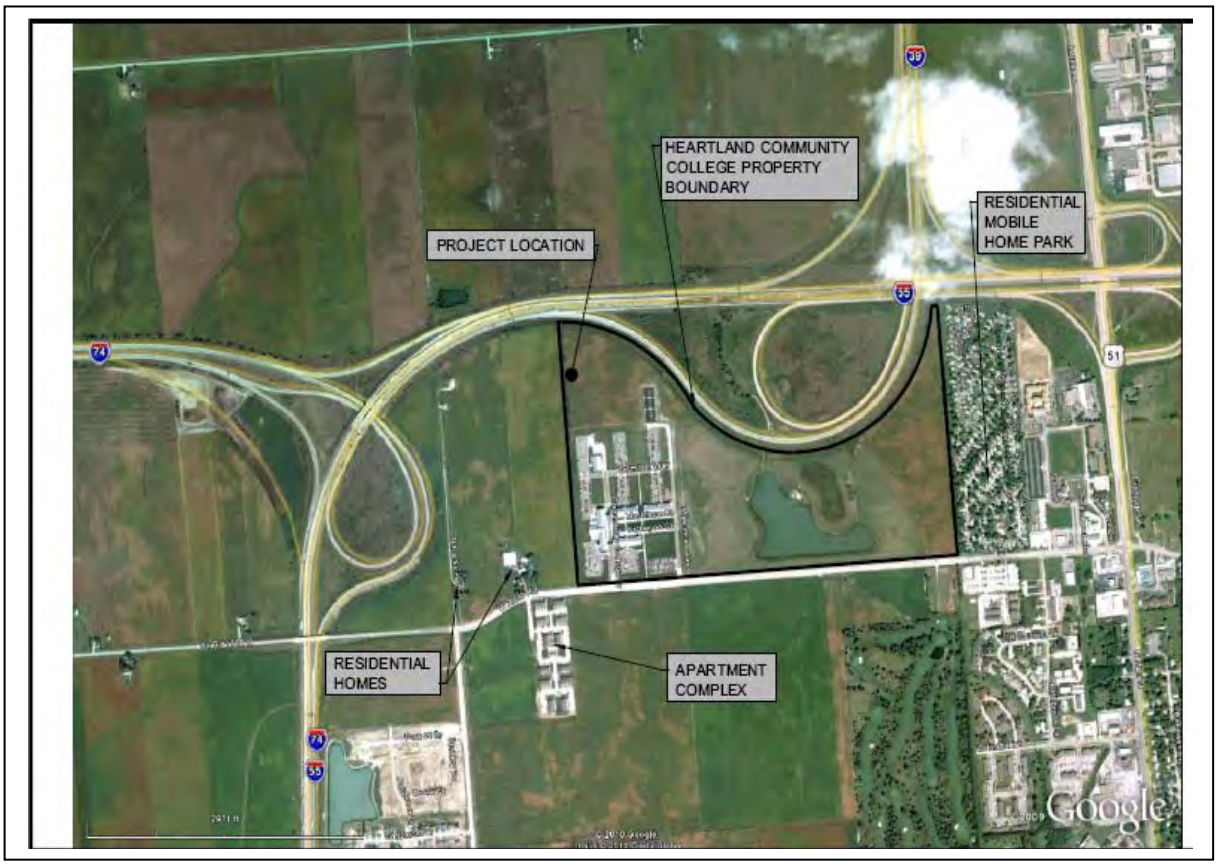

Figure 3-1. Project Location on Aerial Photo

3.2.2.2 Visual Quality

The existing viewshed of the project area is primarily agricultural and mixed-use. Vertical features in the area include a 50 meter (164-foot) meteorological tower located approximately 381 meters (1,250 feet) to the west of the proposed turbine location. All other features in the immediate project area do not have a strong vertical component. The nearest day-to-day viewers of the proposed turbine would be employees, students, and visitors at HCC. Other potential viewers of the proposed turbine, located within a 1.6 km (1 mile) radius of the project area include:

- Vehicles on I-55, I-39, and I-74/Route 51;
- Surrounding farm residences; nearest residence located approximately 0.56 km (0.35 mile) southwest of the project site;
- Residences located along Parkside Road, approximately 1.2 km (0.75 mile) southwest of the project site;

- Normal Community West High School, approximately 1.6 km (1 mile) southwest of the project site;
- Apartment complex located along W. Raab Road, approximately 0.64 km (0.4 mile) south of the project site;
- Users of the Illinois State Golf Course, located approximately 1.2 km (0.75 mile) southeast of the project site; and
- Residential mobile home park, located approximately 1.25 km (0.77 mile) east of the project site.

3.2.2.2.1 Visual Simulations

To address potential concerns about the aesthetic impacts of the proposed project, HCC commissioned a visual simulation of the proposed turbine from various viewpoints. These viewpoints were chosen with the intent to capture predominantly unobstructed views of the proposed project from multiple directions and key receptor vantage points. Photos were taken from these viewpoints and an image of a wind turbine was rendered into the photos at the proper scale and location. See Appendix B for these simulations showing the location of the photographs selected for simulation, and the simulations themselves[1].

Figure 3-2 shows the locations of the photo simulations. The following summarizes the images and the extent to which the turbine would be visible or obstructed:

- Location 1: Looking east from I-55/I-74 at I-55/Highway 51 – Turbine visible, foundation and tower partially shielded by grass-covered berm;
- Location 2: Looking south from E. North Road – Turbine visible;
- Location 3: Looking southwest from I-55/I-39 – Turbine visible, foundation and tower partially shielded by trees/vegetation;
- Location 4: Looking northwest from W. Raab Road – Turbine visible, foundation and tower partially shielded by HCC buildings;

1. Photo simulations are based on an original turbine location approximately 300 feet northeast of the current location under evaluation. The location was changed to remove existing parking lots from the fall zone. 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 preparation of new images was not warranted.

· Location 5: Looking northeast from W. Raab Road – Turbine visible, foundation and tower partially shielded by corn crops;

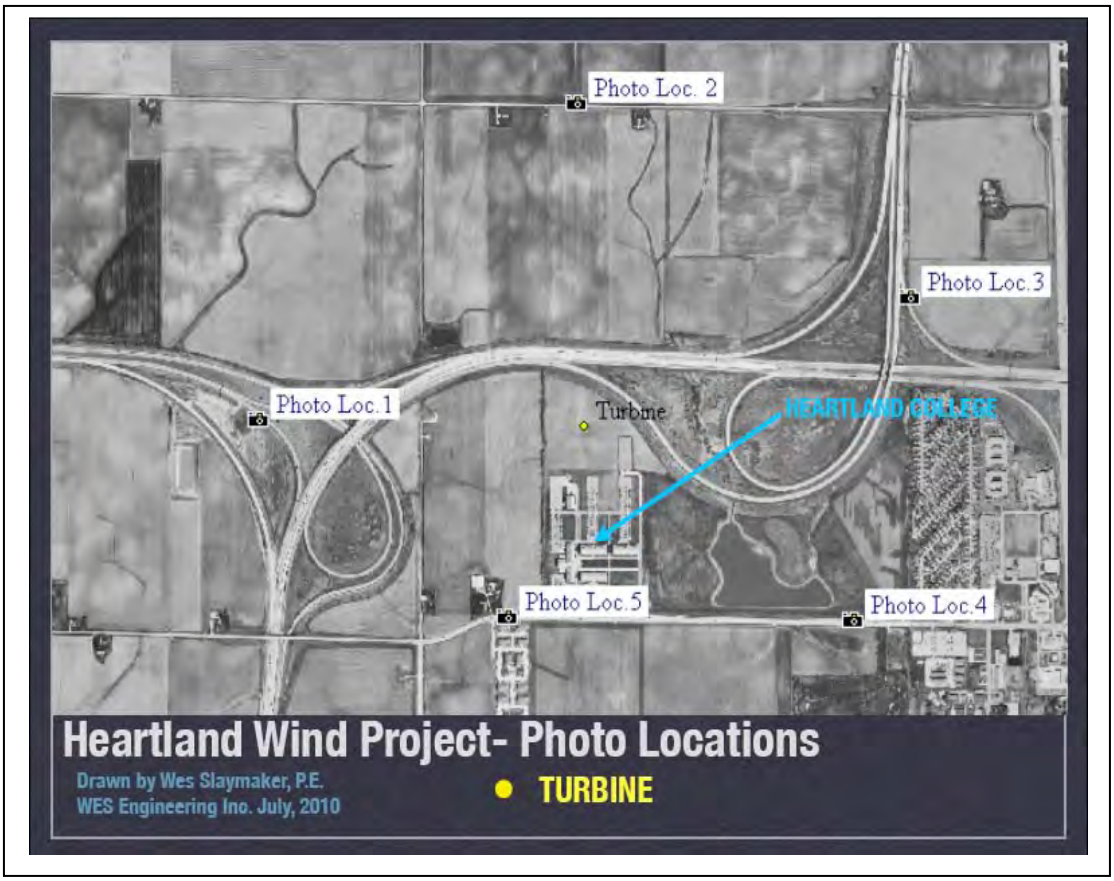

Figure 3-2. Heartland Community College Photo Simulation Locations

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. 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. Shadow flicker becomes much less noticeable at distances beyond 305 meters (1,000 feet). At distances beyond 1,000 meters (3,280 feet), 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.

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. Shadow flicker intensity decreases with greater distance from the receptor to the turbine, up to a point where the change in light intensity is below what the human eye can distinguish. As distance 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.

There is some concern in the public that shadow flicker from wind turbines can cause epileptic seizures. Shadow flicker from wind turbines occurs much more slowly than the light "strobing" associated with seizures. The strobe rates necessary to cause seizures in people with photosensitive epilepsy are 3 to 5 flashes per second and large wind turbine blades are not engineered to rotate at such a high rate (AWEA 2009). For example, the turbine model GE 1.5 MW XLE is engineered for a rotational speed between 10.1 and 18.7 blade rotations per minute.

A shadow flicker study was conducted in September 2010 and is provided as Attachment D-3 in Appendix D.

Direct and Indirect Impacts

The proposed project would affect the viewshed 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 area (e.g., transmission line 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.

According to the Shadow Flicker Report referenced above, the results indicate the shadow impact would affect the Child Development Laboratory building located at the northeastern edge of the HCC campus [approximately 322 meters (1,056 feet) from the proposed turbine location]. According to the report, the shadow impact would occur in May, June and July with the greatest time of 70 minutes per day from 5:30 pm to 6:40 pm. The Child Development Lab operates weekdays from 7:30 am to 5:00 pm and offers care for children of HCC students, faculty and staff, ages 6 weeks to 6 years. Based on the results of the Shadow Flicker Report and the hours of operation of the daycare facility, shadow flicker would not be experienced by children or care providers either in or around the Child Development Lab. Shadow flicker may be experienced during the evening when the only occupants would be students at night classes. If any of the west facing rooms were to be utilized during the limited time period when shadow flicker effects are produced, the building is equipped with blinds to mitigate the impacts. Overall, occupants of the HCC Child Development Lab building would experience shadow flicker less than 1 percent of the time during the year. The Fitness and Recreation Center would experience a maximum

estimated 8 hours of shadow flicker per year. No other campus buildings, and no residences or off campus buildings would experience shadow flicker (Figure 3-3).

The shadow flicker study also determined that there would be some areas of I-55, and the off-ramp from I-55 E to I-39 N, a total length of approximately 1,066 meters (3,500 feet), would experience shadow flicker. The majority of the impacted roadway would experience less than 120 hours of shadow flicker in one year. As there are approximately 4,380 hours of daylight per year at 42 degrees latitude, 100 hours of shadow flicker equates to having no impacts for 97 percent of the daylight hours in a year. Also, approximately 762 meters (2,500 feet) of the off-ramp from I-55 E to I-39 N would experience between 60 and 200 hours of shadow flicker per year, which equates to at least 95 to 98 percent of the daylight hours in a year with no impacts. The brief experience would be comparable to driving late or early in the day while sunlight flickers through nearby trees, vegetation, or other tall structures, conditions experienced often by most drivers.

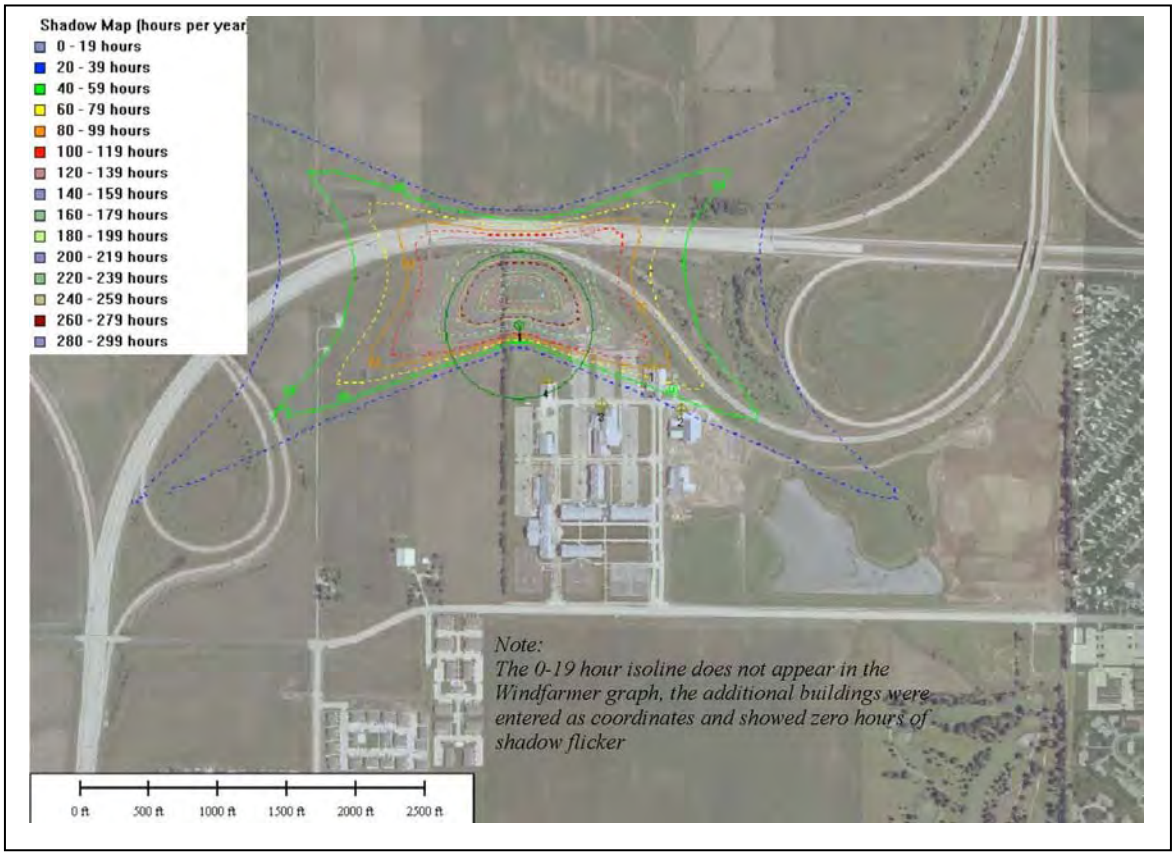

Figure 3-3. Heartland Community College Shadow Flicker Map

Shadow flicker becomes indiscernible at distances beyond 1 km (3,280 feet), Impacts associated with receptors near or beyond this distance generally receive less than 25 hours of shadow flicker per year and the actual shadow becomes defuse by the ambient light so it is not a distinct shadow assuming that the weather is clear, sunny, and windy every day. However, because it is extremely unlikely that the weather would be clear, sunny, and windy every day, shadow flicker would have no impacts for more than 99.5 percent of the daylight hours in a year.

If shadow flicker impacts become an annoyance to nearby receptors, HCC would discuss mitigation techniques with the affected receptor(s) including but not limited to purchasing blinds for windows or planting indigenous trees to attenuate for impacts.

3.2.2.3 Noise

Sound is a result of fluctuating air pressure. The standard unit for measuring sound pressure levels is the decibel. A decibel 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 deemphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear [using the A-weighting filter adjusts certain frequency ranges (those that humans detect poorly)] (Colby et al. 2009).

Noise is any unwanted, undesirable sound. It has the potential to interfere with communication, damage hearing, and, in most cases, it is perceived as an annoyance. Noise can occur in different volumes and pitches depending on the type of source and the distance away. 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. Environmental Protection Agency (EPA) identifies noise levels necessary to protect public health and welfare against hearing loss, annoyance, and activity interference in its document, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA 1974). These noise levels are in terms of "24-hour exposure" levels or an average of acoustic energy over period of 24 hours, and 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, occasional higher noise levels would be consistent with a 24-hour energy average of 70 decibels, so as long as a sufficient amount of relative quiet is experienced for the remaining period of time.

A 24-hour exposure level of 70 decibels 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 decibels outdoors and 45 decibels indoors are defined as preventing activity interference and annoyance to human receptors. 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 Day Night Average Sound Level (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 affected environment.

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). IPCB regulations apply to noise generators and receptors in relation to their respective property lines. For this proposed project noise generated and received within HCC's property line. IPCB standards are not applicable to any receptor on campus. Unlike the EPA noise guidelines the IPCB noise regulations are enforceable.

The GE 1.5 MW XLE, with a hub height of 80 meters (262 feet), and rotor diameter of 80.5 m (264 feet,) was used for this analysis. According to the GE 1.5 MW XLE specifications, the octave band sound power levels at the nacelle are shown in Table 3-1 (from Appendix D-3). This corresponds to a maximum sound level at the nacelle (turbine generator) of 104 decibels.

Table 3-1. GE 1.5 MW XLE Wind Turbine Sound Power Levels

Frequency (Hz)	31	63	125	250	500	1,000	2,000	4,000	8,000
Sound Power Level (dB)	–	83.4	92.2	97.8	99.4	97.7	93.4	86.6	84.8

(–) = value not provided.
dB = decibel.
Hz = hertz.

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 305 and 610 meters (1,000 and 2,000 feet) is generally within 40 to 50 dBA (Colby et al. 2009, referenced herein).

The existing environment for the proposed wind turbine location is a turf field on the northern end of the HCC campus. The north boundary of the campus is bounded by I-55 an eight lane interstate highway and beyond that by agricultural property Additional HCC property and the I-55 off-ramp to northbound I-39 are located to the east of the project location, with the nearest development being a residential trailer park approximately 1,250 meters (4,100 feet) east of the project location. W. Raab Road forms the southern boundary of the campus, 610 meters (2,000 feet) south of the project location; agricultural property is currently the predominant use south of W. Raab Road, with multi-unit residences starting to be developed further south and west of the campus. The area south of W. Raab Rd., while currently agriculture, is zoned for a mix of residential densities (multi-family, single-family, mixed residential), commercial development and "University District." Agricultural land (McLean County zoning designation) borders the western property boundary of HCC (north of W. Raab Road), with a strip of undeveloped commercial land (McLean County zoning designation) west of North Parkside Rd., abutting the eastern boundary of I-55/I-74, and additional agricultural land located further west (McLean County zoning designation). Three single-family homes are located on this agricultural property, the closest being approximately 564 meters (1,850 feet) from the proposed project location.

On September 21, 2010, the HCC Board of Trustees voted to purchase all land (approximately 96 acres) west of the campus's current western property line up to the I-55/I-74 interchange. The property was acquired on October 29, 2010. The purchase represented a strategic acquisition for

future growth. Specific expansion plans do not exist at this time. There are three residential units on the property; two owner occupied and one rental. It is anticipated that the residents of the owner occupied units would be allowed to remain in their homes for up to seven years; however, HCC would own these structures. These residential units are labeled Dwellings 9 and 10 in Figure 3-4 below or in the Shadow Flicker and Noise Report (Appendix D-3).

Table 3-2. Common Outdoor and Indoor Sound Sources and Typical Associated Sound Levels (dBA)

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

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

The nearest on-campus buildings to the proposed turbine location include the Receiving and Storage Building located approximately 140 meters (460 feet) south of the proposed turbine, the Child Development Lab, located approximately 305 meters (1,000 feet) southeast of the turbine, and the Workforce Development Center, located approximately 259 meters (850 feet) south-southeast of the turbine location. Multiple HCC parking lots would be located within a 122 to 305 meter (400- to 1,000-foot) radius to the south-southeast of the turbine location. Heartland is a community college with no on-campus housing.

Direct and Indirect Impacts

Temporary noise would be generated by construction equipment during daytime hours for the duration of the approximately 5 month active construction phase. However, due to the noise generated from the existing on-campus activities and traffic and interstate/roadway traffic as described above, the wind turbine construction noise is not expected to significantly increase daytime ambient noise levels. Furthermore, the nighttime ambient noise environment would not be impacted by the construction phase of the proposed project.

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. Modern wind turbines are generally quiet in operation and the sound is very low compared to that of the traffic and campus activities.

Sound Pressure Levels from point sources diminish at a rate of approximately 6 decibels per doubling of distance from the source. At a distance sufficiently far from the turbine, turbine noise levels would be below ambient noise levels and inaudible. Table 3-3 shows the estimated octave band sound pressure level due to the turbine at the nearest off campus receptor (a single-family residential home) approximately 564 meters (1,850 feet) southwest of the proposed turbine location. These values were developed as described above, using a maximum sound power level of 104 decibels. This value represents the sound power level at the nacelle when wind speeds exceed 17.9 miles per hour (8 meters per second).

Table 3-3. Estimated Turbine Sound Pressure Level at Nearest Residential Receptor (single-family home located approximately 564 meters (1,850 feet) southwest of proposed turbine location – Receptor 9 in Figure 3-4).

Frequency (Hz)	31	63	125	250	500	1,000	2,000	4,000	8,000
Nearest residential receptor	55.9	45.9	44.7	43.3	38.9	34.2	29.9	22.1	22.3
IPCB Nighttime Standard (10 p.m. – 7 a.m.)[a]	69	67	62	54	47	41	36	32	32

a. IPCB nighttime standards are more stringent than daytime standards; therefore, if there were no exceedances during the night, there would not be exceedances during the day.
Hz = hertz.
IPCB = Illinois Pollution Control Board.

Table 3-3 also shows the IPCB nighttime (most stringent) noise standard for sound emitted from Class C lands [Per IPCB regulations, alternative energy sources (i.e., wind projects) are Class C] to Class A lands, which includes residences.

Estimated turbine noise levels under the above scenario at the nearest residential receptor are below IPCB nighttime noise standards (most stringent). Turbine noise levels also would be lower than EPA DNL guidelines of 55 to 65 dBA. Figure 3-4 below shows the modeled sound output from the proposed turbine. Sound levels were determined using the WindFarmer model and maximum sound power level of 104 decibels (WES 2010)

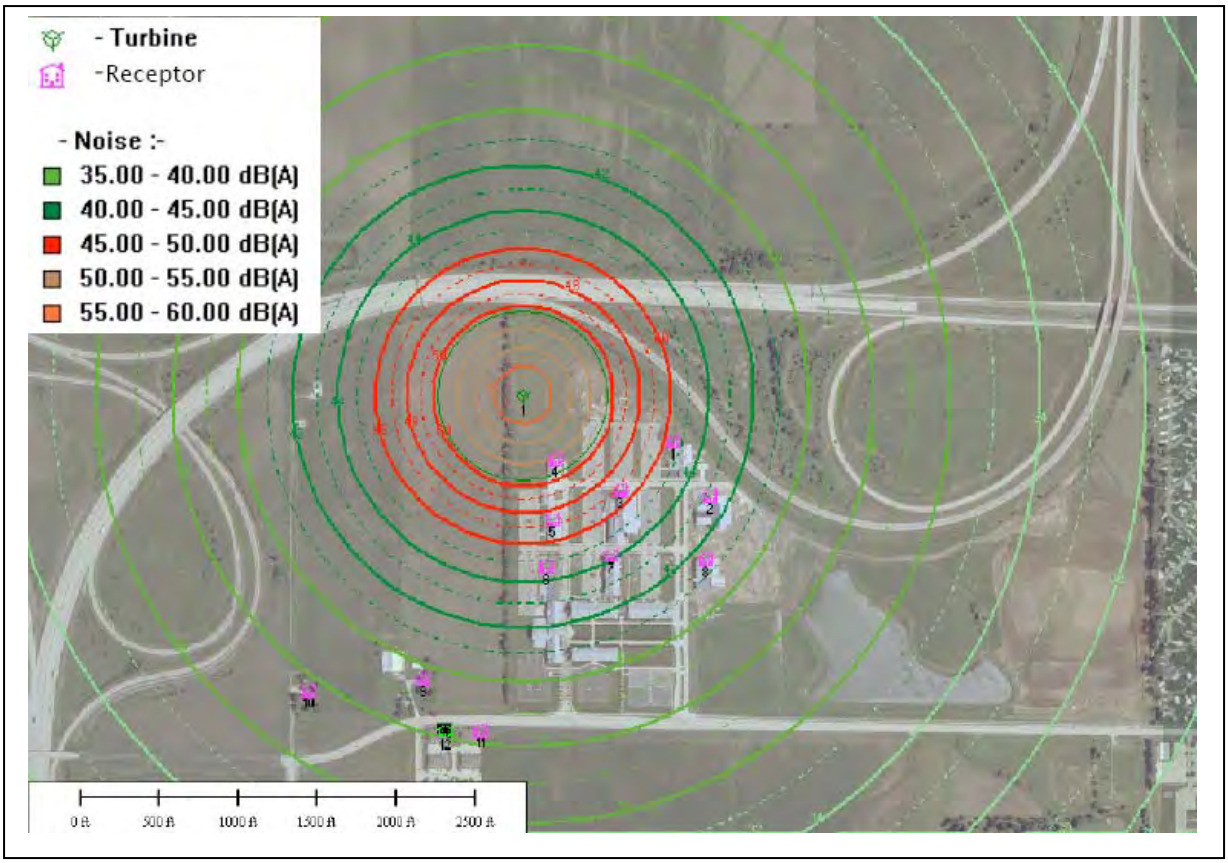

Figure 3-4. Heartland Project Sound Pressure Levels Contour Map

Estimated turbine noise levels under the above scenario at the nearest on campus buildings [Receiving and Storage Building (Receptor 4), Child Development Lab (Receptor 1), and the Workforce Development Center (Receptor 3)] would range between 45.48 and 51.80 dBA, which is lower than EPA DNL guidelines of 55 to 65 dBA.

DOE did not identify any information that suggested children should be considered a particularly sensitive receptor with respect to noise impacts. Therefore, children attending the Child Development Lab are not expected to experience significant impacts as a result of the noise generated by the proposed project.

No significant noise impacts are expected. These results represent maximum potential outdoor results, and use of these buildings is predominantly indoors, thereby reducing the experienced sound level even further. Furthermore, the mechanical, electrical, and HVAC systems, as well as routine movement of students, faculty, and staff and classroom activities (or mechanical equipment operation in the case of the Receiving and Storage Building) all contribute to ambient noise within the buildings (estimated at 40 to 60 dBA, based on Table 3-3) that would be expected to meet or exceed that produced by the turbine in these areas.

3.2.2.4 Cultural and Historic Resources

The 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. On March 26, 2010, HCC submitted a cultural/historical resources consultation letter to the IHPA for the proposed project in accordance with the submittal guidelines (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, using an aboveground area of potential effect (APE) consisting of a 1.6 km (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 1.6 km (1 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 1.6 km (1 mile) radius APE, DOE also conducted a search to identify historic properties that the proposed wind turbine might adversely affect. A review of the NRHP revealed no properties listed within 1.6 km (1 mile) of the project location. The closest listed property was the Gymnasium Building at Illinois State University located approximately 3.2 km (2 miles) south/southeast of the project location. The IHPA's Historic Architectural and Archaeology Resources Geographic Information System (HAARGIS) was reviewed to identify structures potentially eligible for listing in the NRHP. HAARGIS identified no sites potentially eligible for listing in the NRHP (status designated as "Undetermined") within a 1.6 km (1 mile) radius. The closest potentially eligible property was the former McLean County Tuberculosis Sanatorium at the west end of Summit St. at Main St., approximately 2.4 km (1.5 miles) southeast of the project location. Further review concluded that there were no National Natural Landmarks within the APE [closest being Funks Grove, approximately 33.8 km (21 miles) to the southwest], and no sites on the IHPA's list of Illinois State Historic Sites within

the APE [closest being the David Davis Mansion in Bloomington, approximately 6.4 km (4 miles) to the southeast].

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-6). 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 notice of availability for the draft EA and associated 15-day comment period; no comments were received related to that correspondence. Tribal contacts are listed in the stakeholder list (Appendix D-4). No comments regarding DOE's Proposed Action were received from the tribes contacted.

Direct and Indirect Impacts

As described above, no properties listed on or potentially eligible for listing on the NRHP were identified within the APE. It is DOE's conclusion, therefore, that, based on information reviewed and through consultation with the IHPA, no historic properties would be affected by the proposed project [per 32 CFR 800.4(d)(1)]. Through IHPA's review of its internal archaeological database it was concluded that impacts to archaeological resources during construction of the proposed project were not likely. On April 6, 2010, the IHPA provided a written response to HCC indicating its cultural resource review was complete and concluding that, "no historic properties are affected. We therefore have no objection to the undertaking proceeding as planned" (Appendix C-2).

If archaeological resources are encountered during 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 NHPA.

3.2.2.5 Geology and Soil

3.2.2.5.1 Geology

The project site lies within the Bloomington Morainic System. A moraine is a surface feature originating from depositional activities of glaciers, which passed through McLean County in several "waves." The rolling land features of the area are attributable to moraines with postglacial erosion activity contributing to surface relief. Material carried and subsequently deposited by glaciers included clay, silt, sand, gravel, and boulders. The unconsolidated materials lying below the site are more than 61 meters (200 feet) thick (Piskin and Bergstrom 1975).

Meltwater from receding glaciers also carried sediments of clay, sand, and gravel. These sediments were deposited along ancient drainage ways and in many areas created thick deposits of sand and gravel, which currently serve as aquifers for groundwater withdrawals.

The upper portion of the unconsolidated material is clayey material. Water movement through clay materials is very slow. Below the unconsolidated deposits lies consolidated sedimentary bedrock of Pennsylvanian age. Bedrock in this area is comprised of sandstone, creviced limestone, fractured shale and coal. These formations do not constitute what would be considered a "good" aquifer because of low permeability and low water yielding characteristics. The upper bedrock in this area would only be explored for water resources for a small supply if all attempts to secure a water supply from the unconsolidated materials failed.

Seismic activity in McLean County is a not considered a significant risk. The greatest frequency (81 percent) of seismic activity in Illinois occurs in southern Illinois. The last recorded seismic activity originating in McLean County was recorded in 1885. The strength of this earthquake registered as Level III on the Modified Mercalli Intensity Scale. At this strength there are typically no effects on structures, but felt noticeably indoors and standing cars may rock (Heigold and Larson 1990).

3.2.2.5.2 Soil

The surficial soils in the area of the assessment are defined on the Soil Survey Map of McLean County, Soil Conservation Service, United States Department of Agriculture, as shown below in Table 3-4 and in Appendix A- Figure 9 (USDA 1998).

Table 3-4. Project Area Surficial Soils

ID#	Description
154	Flanagan silt loam
145B2	Sable silty clay loam

ID# 154 is classified as Flanagan silt loam. Flanagan silt loam is described as a somewhat poorly drained soil with moderate permeability in the upper part and moderately slow permeability in the underlying material. This type of soil displays a high shrink-swell potential and slow runoff. Flanagan silt loam is well suited for croplands, pasture and hay, and poorly suited for dwellings and septic tank absorption fields.

ID# 145B2 is classified as Saybrook silt loam. Saybrook silt loam is described as moderately well drained soil with moderate permeability in the upper part and moderately slow permeability in the underlying material. This type of soil displays a moderate shrink-swell potential and medium runoff. Saybrook silt loam is well suited for croplands, pasture and hay, is moderately suited for dwellings and poorly suited for septic tank absorption fields.

A request for consultation regarding the project was made to the Natural Resources Conservation Service, Normal, Illinois, Service Center via letter dated July 28, 2010 (Appendix C-6). A response from the Service Center has not been provided at this time.

Direct and Indirect Impacts

Data reviewed from the Illinois State Geological Survey would suggest there is a low risk of seismic activity jeopardizing the structural integrity of the proposed wind turbine.

The proposed project would not impact prime farmland since the project is to be located on previously disturbed land and is currently grass fields. In addition, the land has previously been disturbed for the development of the college campus.

Site preparation and project construction would result in soil disturbance; however, soils at the proposed turbine location have previously been disturbed and graded. HCC would use BMPs and employ NPDES requirements during construction 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 but are not limited to North American Breeding Bird Survey (BBS) data (USGS 2010), INHD (2010), Illinois Natural History Survey (2005, 2009) and the USFWS (2010b). 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.

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 them have been implemented.

According to the United States Geological Survey North American BBS, no BBS routes were found to be located within 8 km (5 miles) of the project area. According to the Birding McLean County website, no bird viewing sites were listed within the immediate vicinity of the project location (Birding McLean County 2007). Additionally, the IDNR lists only one location in McLean County (Moraine View State Park, located approximately 27 km (17 miles) southeast of the project location) as being among the best birding areas in Illinois (IDNR 2010). However, the HCC retention pond, the prairie plot to the north of the pond, and the associated greenspace near the project site are considered by local experts to be bird viewing sites, where a variety of species can be observed. Recent breeding bird and waterfowl counts were provided by local experts documenting the presence of such species on HCC's campus and around the retention

pond. The data results are included in Appendix D-7. 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 45 km (28 miles) to the south/southeast. Additionally, highly suitable avian habitat within the project area is limited; as the project area consists of a previously disturbed field, which was and continues to be disturbed with the ongoing expansion of the college (see Appendix A- Figure 4 and 5). The surrounding area is comprised of primarily agricultural lands and previously developed areas in and around the Town of Normal and the city of Bloomington. There are no riparian corridors or naturally occurring woodland habitat occurring within 3.2 km (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. 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 43 km (27 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 land at the project site was previously graded for the development of the college and currently consists of a field, which has grown up with native vegetation since the grading and, therefore, would not be considered a suitable habitat for bald and golden eagles and raptors.

3.2.2.6.3 Bats

No records of specific bat surveys in McLean 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 Species Profile (BCI 2010b), a total of 8 bat species have geographic distributions that may include the project area including (the Threatened and Endangered Species section of this EA discusses the Indiana):

- Big brown bat (*Eptesicus fuscus*)
- Silver-haired bat (*Lasionycteris noctivagans*)
- Eastern red bat (*Lasiurus borealis*)
- Hoary bat (*Lasiurus cinereus*)

- Little brown myotis (*Myotis lucifugus*)
- Indiana bat (*Myotis sodalis*)*
- Evening bat (*Nycticeius humeralis*)
- Tri-colored bat (*Perimyotis subflavus*)

These species roost in forest habitats, cliff faces, meadows, farmlands or edge habitats (BCI 2010b). Many of these species forage along tree tops, disturbed areas and small clearings, or along roadways or water courses (BCI 2010b). The big brown bat is most abundant in deciduous forests but this generalist species will also forage over agricultural fields (BCI 2010b).

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. According to the IDNR EcoCAT, there were no occurrences of the Indiana bat in the vicinity of the project (Appendix C-1).

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 (INHS 2005). Based on consultations with IDNR, tree bats including those listed above have been known to migrate in large numbers over agricultural fields and towns in the Midwest, including McLean County.

3.2.2.6.4 Threatened, Endangered, and Special Concern Species

Information regarding the potential occurrence of Federally listed species was reviewed using the USFWS Endangered Species website and a list of potentially occurring listed species for McLean County, Illinois was prepared (USFWS 2010b).

The USFWS lists two Federally listed species for McLean County; the Indiana bat (*Myotis sodalis*) and the Eastern prairie fringed orchid (*Platanthaera leucophaea*) (USFWS 2010b). The Section 7 Consultation Letter (Appendix C-5) was provided to the USFWS indicating that the site did not provide suitable habitat for the Eastern prairie fringed orchid due to its disturbed mature and agricultural use. In its letter dated September 10, 2010, the USFWS concurred with this determination and found that the proposed project would have no effect on this species.

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 McLean County, Illinois, and the nearest known hibernaculum and designated critical habitat area is Blackball Mine in LaSalle County, Illinois (Priority 2 hibernaculum), 90 km (56 miles) north 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's INHD was searched for known occurrences of State-listed threatened or endangered species within McLean County. Consultation with the IDNR has

shown that the INHD contains no records of State-listed species occurring in the project area or surrounding vicinity. The INHD lists the State-listed threatened and endangered upland sandpiper, least bittern and loggerhead shrike, which are all migrating species, as potentially occurring within McLean County (INHD 2010). The natural resource review provided by IDNR's EcoCAT concluded that the INHD contains no record of State-listed threatened or endangered species in the vicinity of the proposed project and that adverse effects to state-listed species are unlikely (Appendix C-1). Furthermore according to the IDNR EcoCAT, there were no occurrences of the Indiana bat in the vicinity of the project. The INHD does not include records of Illinois Natural Area Inventory Sites, dedicated Illinois Nature Preserves, registered Land and Water Reserves, or wetlands in the vicinity of the project area.

3.2.2.6.5 Plant Species

Vegetation in the proposed project area consists of grass fields. The lands that would be primarily affected by the Wind Energy Project, including the location of the turbine and transmission line, have been previously disturbed by college campus facilities. Conservation measures include voluntary cleaning of equipment/vehicles, use of clean fill and mulch, and avoiding planting invasive species. The project proponents would include these conservation measures as notes on the construction drawings to ensure they are implemented.

Direct and Indirect Impacts

The land at the project site was previously graded for the development of the college and currently consists of a field which has grown up since the grading. The project would consist of a single turbine. As described in 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.

HCC would conduct voluntary post-construction avian and bat mortality surveys. Voluntary monitoring would likely consist of an initial post-construction fall migration season (approximately 8-12 weeks, based predominantly on Indiana bat migration habits). HCC plans to implement the voluntary monitoring with in-kind support/oversight from HCC faculty/staff, or with faculty/staff support from nearby Illinois State University. This monitoring will provide data to the USFWS, DOE and IDNR on potential avian and bat mortality associated with single wind turbines. DOE is working with USFWS Region 3 to establish an appropriate protocol for post-construction monitoring. The final protocol is expected to include details related to timing, frequency, and reporting. HCC would implement monitoring consistent with the final protocol.

Migratory Birds, Bald and Golden Eagles

HCC has and would continue to give consideration to the *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (USFWS 2003). HCC has committed to incorporating those applicable recommendations as appropriate and has included them as Project Proponent Committed Practices for the proposed project, in order to avoid and minimize potential impacts to migratory birds and bald and golden eagles. HCC has also reviewed and incorporated several of the BMPs from the USFWS Wind Turbine Guidelines Advisory

Committee's Site Development and Construction BMPs (USFWS 2010). The following is a brief description of facts demonstrating that HCC would follow USFWS's Interim Guidelines. The project is a single wind turbine located in already disturbed habitat. Therefore, configuration of turbines is not applicable. 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 acres. However the area around the turbine is a turf field and does not provide significant bird habitat or fragment any such habitat. Construction BMPs would be implemented as part of the proposed project. All but the 0.2 acre footprint of the wind turbine would be revegetated with indigenous species and continue to be an unmaintained as a turf field. Aviation lighting would be utilized, the minimum required by FAA in order to minimize potential bird and bat impacts.

Both the USFWS and IDNR were consulted prior to 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. Based on DOE's review of the USFWS Spring/Fall Raptor Migration Routes (Appendix A- Figures 13 and 14); DOE does not believe that the proposed turbine location is located in or near a migratory pathway. Furthermore, the proposed project is not located within an Audubon-designated IBA. The proposed project is a single turbine; therefore, configuration of turbines (plural) was not necessary. The area around the turbine is mainly agricultural and does not provide significant bird habitat nor does the project fragment any such habitat. The proposed project site is bounded on the north by I-55, with agricultural land located further north of the interstate; to the south by the college campus, with W. Raab Road and primarily agricultural land located further south; to the east by an I-55 off ramp and agricultural land, and to the west by agricultural land. The proposed turbine design is a monopole and no external features are proposed to the design. Strike risk is not considered high at this location and all electric lines would be placed underground.

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 cultivated crops, and lack of highly suitable nesting or foraging habitats, may lower the overall risk to birds from the project. The predominance of previously disturbed grass fields, 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 from 0.7 to 1.0 acre per turbine, leaving the majority of existing habitats on the project area intact (Strickland 2004). 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.

Bats

The proposed project site is not considered highly suitable bat habitat. Recent studies for three wind facilities in Wisconsin (Blue Sky Green Field, Cedar Ridge, and Forward Energy) estimated the 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, which consist of 88, 41, and 86 turbines, respectively (Drake et al. 2010; BHE 2010; Gruver et al. 2009). 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 an average of three bats killed per turbine per year (Kerlinger et al. 2007). For three sites in the Midwestern United States (Buffalo Ridge, Minnesota; Lincoln, Wisconsin; and Top of Iowa, Iowa), 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) (BHE 2010). These high proportions of little brown bats are unlike those found at Crescent Ridge, Illinois (Kerlinger et al. 2007) and Buffalo Ridge, Minnesota (BHE 2010) and may have contributed to higher overall bat mortality (BHE 2010).

Although some bats would be killed by the operating wind turbine, DOE does not anticipate this project would impact bat populations. Since there is no suitable foraging or roosting habitat at the site or adjacent properties, coupled with the fact that the project consists of a single wind turbine, DOE expects bat fatalities to be at the lower range of annual fatalities provided above.

Threatened, Endangered, and Special Concern Species

The proposed project site does not include suitable wintering habitat (hibernacula) for the Indiana Bat, and there is no known highly suitable foraging habitat for this species 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, approximately 92 km (57 miles) to the southeast of the proposed project location. USFWS Concurrence Letter stated, “The risk to migrating bats is difficult to characterize because little is known of the migratory patterns of this species” (Appendix C-5). Based on previous consultations with the USFWS on other proposed DOE funded single turbines in Illinois; expanses of 305 meters (1,000 feet) or greater are not generally spanned by foraging Indiana bats and it is believed use of the noncontiguous habitat is unlikely. Based on these facts, the USFWS concurred with DOE’s determination that the project “may affect but is not likely to adversely affect Indiana bats and the likelihood of take is discountable” (Appendix C-5).

The USFWS concurred with DOE’s determination in DOE’s September 10, 2010, letter 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. Therefore, implementation of the proposed project is not likely to adversely affect or pose a significant impact to 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 information prepared and presented to IDNR for this project and consultation with IDNR, there are no records of State-listed threatened, endangered, or special concern species for the project area or surrounding vicinity. Based on consultations with USFWS and based on the

lack of highly suitable habitat occurring in the project area, it is unlikely that Federally listed threatened or endangered species would be affected by the proposed project.

Plant Species

The land areas that would be primarily affected by the Wind Energy Project include the foundation of the turbine and transmission line trenching. These areas have been previously disturbed by college's development. Conservation measures include cleaning of equipment/vehicles to reduce the transplantation of an invasive species, use of clean fill and mulch, and by replanting with only native plant species. The project proponents would include these conservation measures within the construction requirements to ensure they are implemented. No significant 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 133 meters (440 feet).

Collapse of a turbine or breakage (and throwing) of one or more turbine blades are possible, but very unlikely occurrences. Estimates of blade throw vary; MacQueen et al. (1983) estimate the probability of being struck outside of a one blade diameter (82 meters, or 269 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.

The potential for the proposed turbines to fall over or collapse causing damage, injury, or death would be remote. Foundations are designed to prevent turbines from falling over, but 5 of the 13,000 or 0.0004 percent of GE turbines operating globally have collapsed since 2002 (Bogdan 2009). Although tower collapses are rare, reported instances have been due to circumstances including blade strikes, rotor over speed (due to brake failure in high winds), 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 HCC facilities or parking areas are located within the fall zone. A proposed new parking lot to be located on HCC property is currently under preliminary design. There is potential for this parking lot to be sited within the northwest portion of the HCC campus, within the fall-zone radius; however, a specific location for the parking lot is yet to be determined. Any proposed project occurring within the fall zone would do so under full knowledge of the risks posed to human health and safety.

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, though Central Illinois Regional Airport at Bloomington-Normal is located approximately 8.8 km (5.5 miles) southeast of the proposed project location. All structures more than 61 meters (200 feet) tall must have aircraft warning lights in accordance with requirements specified by the FAA.

Direct and Indirect Impacts

All contractors, subcontractors, and their personnel 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 due to the project. Members of the general public would be prevented from accessing the wind project area by fencing and security. 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. HCC 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, lightning strikes or ice throw, no existing structures, public access or roads would be impacted.

Due to the extreme rarity of tower collapse or blade throw and the risks to the public safety due to such occurrences can be mitigated by management of access within these zones. The same access management strategies can mitigate the risks to public safety due to ice throw or shedding

conditions, which are in effect only on a limited temporal basis. Additionally, the nearest public area (HCC parking lot K) is approximately 134 meters (440 feet) away from the proposed wind turbine location, which is anticipated to be outside the ice throw or fall-zone areas. In cases of turbine collapse, the turbine would tend to buckle and, therefore, fall somewhere within this analyzed area.

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 November 16, 2009, the aeronautical study performed 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).

This determination was made prior to HCC's decision to adjust the proposed location of the wind turbine. The updated location is the location analyzed within this EA (approximately 100 meters (328 feet)) west-southwest of the previous location in which the FAA's determination of no hazard to air navigation was applicable). This change voids the determination included in Appendix C. Under the direction of DOE, HCC is currently seeking a new determination from FAA for the new location. However, due to the minimal change in distance, and after reviewing the information attached in the original determination, DOE anticipates that the proposed project would continue not be a hazard to air navigation.

3.2.2.8 Transportation

The project site, as well as the entire HCC campus, is primarily served by W. Raab Road on the south side of the campus. 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 HCC is via Exit 165 (N. Main Street) on I-55 to W. Raab Road, approximately 1.6 km (1 mile) east of the campus.

Construction equipment would travel to the project site via I-55, US-51 BUS (Exit 165), south on Main Street and west on W. Raab Road, or would travel to the project site via I-74, Mitsubishi Parkway (Exit 125), southeast on Yuton Road. Access from W. Raab Road to the construction site is via Millennium Avenue, a campus entrance road located southeast of the proposed wind turbine location. Large pieces of equipment such as the turbine tower, rotor blade, and nacelle would be designated oversized loads.

A plan has not been finalized regarding transportation of project materials and equipment; however, it is likely the project would use existing infrastructure.

Direct and Indirect Impacts

A permanent gravel access road would be constructed from the northern edge of the campus at a length of 183 meters (600 feet) as an extension of Parking Lot K to the proposed wind turbine location (Appendix A- Figure 5). No other new roads are necessary for the construction, operation and eventual decommissioning of the wind turbine at the proposed location.

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 identified above surrounding the project site is anticipated. No long-term or permanent impacts to the local transportation systems would occur as a result of this project.

The movement of large pieces of equipment would temporarily slow traffic on the Interstate freeways. Local traffic impacts would be primarily along Main Street (south of Exit 165) and W. Raab Road. Additionally, minor road improvements or adjustments might be needed to deliver the extended-length components to the project site. Any necessary road closures would be temporary and would only apply to the roads immediately surrounding the project site. Any damage to the local road network as a result of delivering project equipment would be fully mitigated and repaired by the project developer.

3.2.2.9 Socioeconomics and Environmental Justice

The Town of Normal's population in 2000 was approximately 45,386 (Bureau of the Census 2000). Major local employers in the town include Illinois State University, State Farm Insurance, Country Financial, Unit 5 Schools, and Mitsubishi Motors North America.

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 Town of Normal in 2000 was 86.6 percent White, 8.5 percent African American, 3.1 percent Hispanic and remaining as other races. The median income for a household in the Town of Normal in 2000 was $47,283, compared to $52,175 for the United States. About 7.2 percent of families and 21.2 percent of individuals were below the poverty line in 2000 (Bureau of the Census 2010).

DOE reviewed *Economic Impact, Wind Energy Development in Illinois* by the Center for Renewable Energy at Illinois State University (ISU 2010). This economic analysis monitored the economic impacts of 21 projects in Illinois which account for 1,847.76 megawatts 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, 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 Impacts

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 on average 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 megawatts over which to spread any effect. HCC'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 faculty 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 Wind Energy 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/), McLean 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 HCC wind turbine would have an indirect impact on carbon dioxide emissions from fossil fuel sources.

Electricity for HCC is currently supplied by Corn Belt Energy. Corn Belt Energy's power supplier, Wabash Valley Power Association generates electricity and also purchases electricity from other utilities. According to the Corn Belt Energy website, the Wabash Valley Power Association obtains its electricity through coal-fired power plants (65 percent), pet coke (11 percent), renewable sources (4 percent), nuclear (7 percent), non-fuel specific (10 percent), and

natural gas (2 percent) (Corn Belt Energy 2010). Therefore, fossil fuels are currently the primary electricity source for the HCC.

Direct and Indirect Impacts

The proposed Wind Energy Project at HCC 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 HCC's carbon footprint by reducing reliance on fossil fuels. It is assumed if the Wind Energy Project was not built; the electricity used by HCC would continue to be supplied primarily by fossil-fuel sources. The annual energy capture associated with the installation of a 1.5-megawatt wind turbine at the HCC campus is anticipated to be approximately 4.3 million kilowatt-hours per year (AESI 2009). According to the Corn Belt Energy website (http://www.cornbeltenergy.com/about-us/news-center/company-profile.html), its provider, the Wabash Valley Power Association, obtains 78 percent of its electricity through fossil fuels including coal, natural gas, and petroleum coke (Corn Belt Energy 2010). Therefore, the project carbon reduction is calculated as follows:

> 78 percent fossil fuel use × 2.0562 pounds of carbon dioxide per kilowatt-hour × 4,267,000 kilowatt-hours per year = 6,843,568 pounds of carbon dioxide per year or 3,421 short tons of carbon dioxide per year or 3,104 metric tons of carbon dioxide per year or 3,055 long tons of carbon dioxide per year. The proposed project would reduce HCC's carbon footprint by reducing its reliance on fossil fuels.

3.2.2.11 Utilities and Energy

The proposed Wind Energy Project would have a nameplate capacity of 1.5 megawatts and is anticipated to offset approximately 500 kilowatts of electrical load; with the current electrical load for HCC averaging 815 kilowatts (AESI 2009). This represents approximately 61 percent of HCC's demand over an average day. The proposed renewable energy project would produce significant amounts of clean electricity for the 20-year design life of the project. If the project did not move forward, it is assumed the electricity used by HCC at this location would continue to be supplied primarily by fossil fuel sources, which are finite.

The term electromagnetic fields refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from the voltage or electric charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, collector lines, substation transformers, house wiring, and electric 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 NTIA is responsible for managing the Federal 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 Impacts

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 HCC's carbon footprint.

On July 8, 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 27, 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).

4. CUMULATIVE IMPACTS

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

4.1 Existing and 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 Wind Energy Project. DOE consulted with local planning departments and local chapters of the Chamber of Commerce via phone and email, and conducted searched via the internet, to identify current and future projects in to the vicinity of the proposed HCC wind turbine location. No pending or planned projects were identified within the area to be affected by the turbine's land use, visual impacts, or noise impacts. Additionally no past projects have been identified that could have a cumulative impact when combined with the impacts of the proposed project.

In regard to cumulative impacts to biological resources, i.e., migratory birds and bats, and threatened and endangered species, DOE reviewed the April 2007 USFWS Indiana Bat (Myotis sodalis) Draft Recovery Plan (USFWS 2007). The Draft Recovery Plan notes that Indiana bat migration and swarming patterns "have not been extensively studied and are poorly understood" and summarizes existing data (USFWS 2007). Eight fall swarming period studies indicated a migratory range of 0.32 to 30.6 km (0.2 to 19 miles). Eight spring emergence studies indicated a migratory range of 16.1 to 96.6 km (10 to 60 miles) and two spring emergence studies indicated migratory distances of 477 and 575 km (296 and 357 miles) (USFWS 2007, pp. 41-44). Based on this data, DOE determined that 96.5 km (60 miles) is a reasonable distance 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-Figure 13 and 14), the closest known migratory bird corridor (fall migration) to the proposed project is the Illinois River, located 48 km (30 miles) to the northwest. The 96.5 km (60 mile) radius encompasses this area and, thus, also is a reasonable distance for evaluating the potential for cumulative impacts to migrating birds.

DOE identified the following wind energy projects that are within a 96.6 km (60 miles) radius of the site.

Existing projects (data as of January 1, 2010 from the Illinois Wind Working Group)

Twin Groves Wind Farm, McLean County, IL
Approximately 32 km (20 miles)
Operating 240 turbines at 400-megawatt capacity

Porta High School

Approximately 96.5 km (60 miles), Menard County, IL
600-kilowatt capacity

Rail Splitter Wind Farm, Tazewell County, Logan County
Approximately 50 km (31 miles)
Operating 67 turbines at 100-megawatt capacity

Cayuga Ridge, Livingston County, IL
Approximately 68 km (42 miles)
Operating 150 turbines at 300-megawatt capacity

Sugar Creek Wind Farm, Logan County, IL
Approximately 72 km (45 miles)
Operating 110 wind turbines at 220-megawatt capacity

Richland Community College, Macon County, IL
Approximately 74 km (46 miles)
Operating 1 turbine at 100-kilowatt capacity

Grand Ridge Wind Farm, LaSalle County, IL
Approximately 76 km (47 miles)
Operating 74 wind turbines at 111-megawatt capacity

Camp Grove Wind Farm, Marshall and Stark Counties, IL
Approximately 48 miles
Operating 100 wind turbines at 150-megawatt capacity

Top Crop Wind Farm, LaSalle, Grundy and Livingston Counties, IL
Approximately 77 km (48 miles)
Operating 68 wind turbines at about 100-megawatt capacity

Grand Ridge Wind Farm Expansion, LaSalle County, IL
Approximately 79 km (49 miles)
Operating 66 turbines at about 111-megawatt capacity

Providence Heights and Crescent Ridge Wind Farms, Bureau County, IL
Approximately 89 km (55 miles)
Operating 36 wind turbines at 72-megawatt capacity for Providence Ridge
Operating 33 wind turbines at 54.45-megawatt capacity at Crescent Ridge

Porta High School, Menard County, IL
Approximately 95 km (59 miles)
Operating 1 wind turbine at 600-megawatt capacity

Agriwind, Bureau County, IL
Approximately 97 km (60 miles)

Operating 4 turbines at 8.4-megawatt capacity

Permitted Projects for Construction

White Oak Wind Energy Center, McLean County, IL
Approximately 8 km (5 miles)
150-megawatt capacity

Twin Groves Wind Farm III, IV, and V, McLean County, IL
Approximately 21 km (13 miles)
200-megawatt capacity each

Top Crop Wind Farm, LaSalle, Grundy and Livingston Counties, IL
Approximately 69 km (43 miles)
207-megawatt capacity

Proposed Projects

Chenoa Wind Farms II, III, and IV (proposed), McLean County, IL
Approximately 35 km (22 miles)
200-megawatt capacity each

Alta II Wind Farm (proposed), DeWitt County, IL
Approximately 34 km (21 miles)
Operating 125 wind turbines at 225-megawatt Capacity

Alta I Wind Farm (proposed), McLean and DeWitt Counties, IL
Approximately 42 km (26 miles)
Operating 187 wind turbines at 330-megawatt Capacity

Pleasant Ridge Wind Farm (proposed), Livingston County, IL
Approximately 58 km (36 miles)
Operating 333 units at 500-megawatt capacity

Midwest Wind Energy Farm (proposed)
Approximately 64 km (40 miles)
Capacity unknown at this time

Paxton Wind Farm (proposed), Iroquois and Ford Counties, IL
Approximately 82 km (51 miles)
Capacity unknown at this time

K4 Wind Farm (proposed)
Approximately 89 km (55 miles)
460-megawatt capacity

Other development included:

- The ongoing construction of a Multimodal Transportation Center in Uptown Normal which began construction in the summer 2010 and is expected to be completed in approximately 24 months. The Transportation Center will be a 68,000-square-foot, four-story structure with an attached parking structure. The facility will replace the existing Amtrak station and also connect that passenger rail service with other transportation modes.

- The Illinois Army National Guard is proposing to construct and operate the 404th Maneuver Enhancement Brigade Headquarters on HCC's campus. The 50,000 square foot facility would sit on 20 acres in the middle of Heartland's property along W. Raab Road. It would be south of the Astroth Community Center and west of the campus pond. A small portion of the space to be utilized would include the proposed Ready-Response parking lot, which likely would be located to the west of Parking Lot K (Appendix A-Figure 5), located within the fall zone of the proposed wind turbine. The Illinois Army National Guard is aware of the proposed construction of the proposed Wind Energy Project.

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. The average size of the wind turbine installed in 2008 was 1.67 megawatts and in 2007 it was 1.65 megawatts (ISU 2010). Although it is reasonable to conclude from the Governor's Plan that more wind turbines would be proposed than those listed above, their locations and timing are not reasonably foreseeable at this time.

4.2 Summary of Cumulative Impacts

4.2.1 CUMULATIVE GREENHOUSE GAS IMPACTS

While the scientific understanding of climate change continues to evolve, the Intergovernmental Panel on Climate Change *Fourth Assessment Report* 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 HCC, resulting in a net decrease in emissions of approximately 2,751 metric tons of carbon dioxide equivalents for each year of operation. The proposed project in combination with the above-listed wind energy 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 GHG 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 I-55 and on local area roads, and noise generated by the campus' daily operations (i.e., vehicle movement, building operations, and staff/student activities). There would be temporary noise generated during the proposed construction of the Army National Guard's planned headquarters for the 404th Maneuver Enhancement Brigade. However this noise would primarily be associated with construction and operation of the proposed facility. The Illinois Army National Guard would have to address noise levels emitted during the day; however, use of the facility is expected to be similar in nature to the current use of existing buildings on the HCC campus. During the operational phase of the proposed National Guard facilities, increases in ambient noise levels during daytime hours would likely be insignificant. 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 semi-rural nature of the area.

Based on the review of existing and reasonably foreseeable project, no projects other then the proposed Illinois National Guard project is in close enough proximity to HCC's proposed project to significantly 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 due to its height. There are several wind projects in the region surrounding the proposed HCC turbine. The closest known project permitted for construction is White Oak Wind Energy Center, which is approximately 8 km (5 miles) from HCC. Three other wind farm projects permitted for construction are Twin Groves Wind Farms II, IV, and V which are approximately 21 km (13 miles) or more proceeding east from the Town of Normal. All other known wind farms and proposed projects are located approximately 32 km (20 miles) or more from the HCC site. The project sites are unlikely to be located within the same viewshed of the proposed project. Therefore, there would not be a significant cumulative visual impact from the proposed HCC wind turbine.

4.2.4 BIOLOGICAL RESOURCES

The USFWS lists all of Illinois as potential habitat for the Indiana bat, a threatened and endangered species (http://www.fws.gov/midwest/endangered/lists/illinois-spp.html). However, there have been no known occurrences of the Indiana bat in McLean 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 Black Ball Mine, which is approximately 96 km (60 miles) to the north of the proposed project site.

Although some recent studies have shown that Indiana bat may migrate to hibernaculum up to 575 km (357 miles), the *Indiana Bat Draft Recovery Plan* (USFWS 2007) also indicates that the Indiana bat's typical migration is within a distance of 96 km (60 miles). Based on the existing 1004 turbines operating and the other reasonably foreseeable projects (estimated to be greater than 860 turbines) within 96 km (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 raptor migration corridors according to the USFWS's map of Fall and Spring Migratory Bird Information (Appendix A- Figures 13 and 14), no Audubon 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 Illinois River, 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 significant cumulative impacts posed by the larger turbine capacity in the area.

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

5. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible and irretrievable commitment of resources is defined as a permanent reduction or loss of a resource that, once lost, cannot be regained. The primary irretrievable and irreversible commitment of resources for the proposed project would be the labor, materials, and energy expended in clearing the site and constructing the wind turbine. Approximately 0.2 acre (8,712 square feet) of land would be irreversibly committed during the functional life of the project.

6. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term use of the environment is the use during the life of the project. Long-term productivity refers to the period of time after the project has been decommissioned, the equipment removed and the land reclaimed and stabilized. The short-term use of the project area for the proposed project would not affect the long term productivity of the area. If it is decided at some time in the future that the project has reached its useful life, the turbine, tower, foundation, and access road could be decommissioned and removed, and the site reclaimed and re-vegetated to resemble a similar habitat to the pre-disturbance conditions. The construction of a wind turbine at this site would not preclude using the land for purposes that were suitable prior to this project.

7. UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts associated with the proposed project include:

- Long-term loss of approximately 0.2 acre (8,712 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 one HCC building located at the northeastern edge of campus
- 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.

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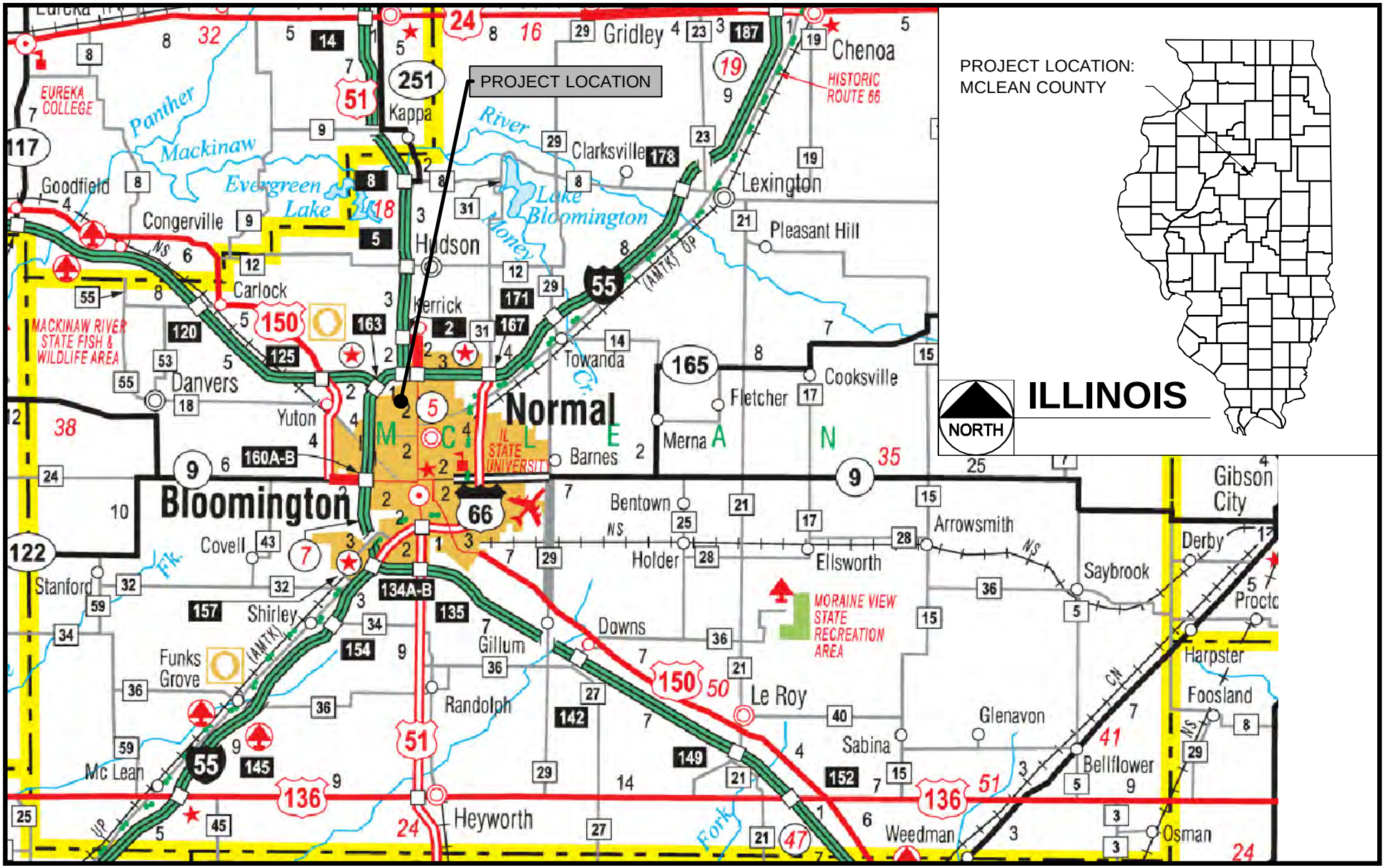
9. AGENCIES AND PERSONS CONSULTED

The following is a list of persons, agencies and organizations that have been contacted about this project to date.

Name	Title	Organization	Address	Phone
Jim Hubbard	Facilities Director Physical Plant Building	Heartland Community College	1500 W. Raab Road, Normal, IL 61761	309-268-8453
Gerald Downing		Illinois Department of Commerce and Economic Opportunity	620 East Adams St. Springfield, IL 62701	
Alyson Grady		Illinois Department of Commerce and Economic Opportunity	620 East Adams St. Springfield, IL 62701	
Jonathan Feipel	Deputy Director	Illinois Department of Commerce and Economic Opportunity	500 East Monroe (Illinois Energy Office), Springfield, IL 62701-1643	
Anne Haaker	Deputy SHPO	Illinois Historic Preservation Agency	1 Old State Capitol Plaza, Springfield, IL 62794-1507	
Emilie Eggemeyer	Cultural Resource Manager	Illinois Historic Preservation Agency	1 Old State Capitol Plaza, Springfield, IL 62794-1507	
Mr. Thomas Cuddy		Federal Aviation Administration- Office of Environment and Energy	800 Independence Avenue, SW, Room 900, Washington, DC 20591	202-493-4018
Attention: Scott Hoeft		McLean County Farm Bureau	2243 Westgate Drive, Suite 501, Bloomington, IL 61705	
	McLean County Unit	University of Illinois Extension	402 North Hershey Road, Bloomington, IL 61704	
Attention: Dr. Allen Goben		Heartland Community College	1500 W. Raab Road, Normal, IL 61761	
Dr. Al Bowman		Illinois State University	421 Hovey Hall, Campus Box 1000, Normal, IL 61790-1000	
Attention: Richard Wilson		Illinois Wesleyan University	1312 Park Street, Bloomington, IL 61701	
Attention: Joseph E. Crowe	Deputy Director, Region 3 Engineer	Illinois Department of Transportation	13473 IL Hwy. 133, P.O. Box 610, Paris, IL 61944-0610	

APPENDIX A: FIGURES



PROJECT LOCATION:

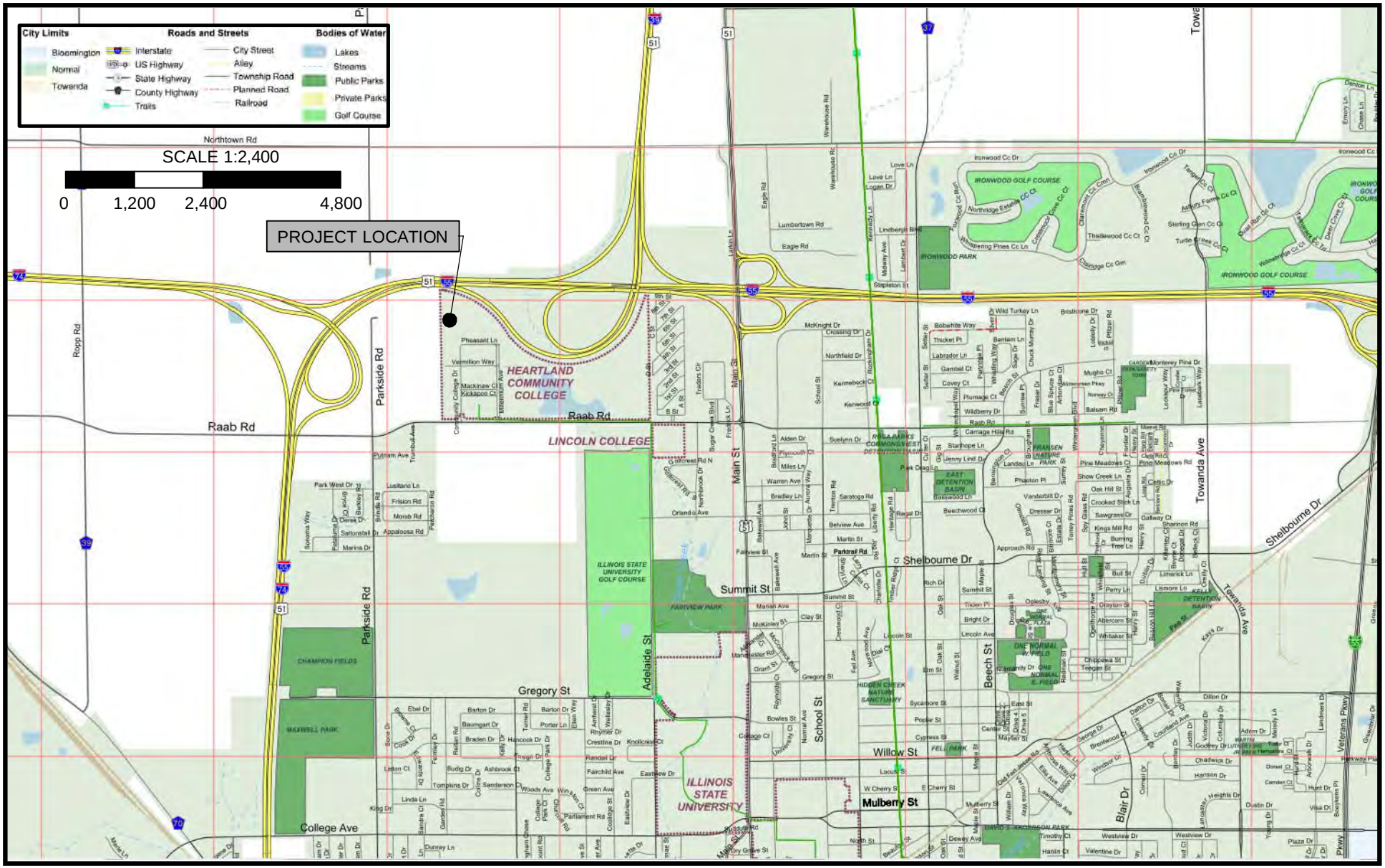
LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

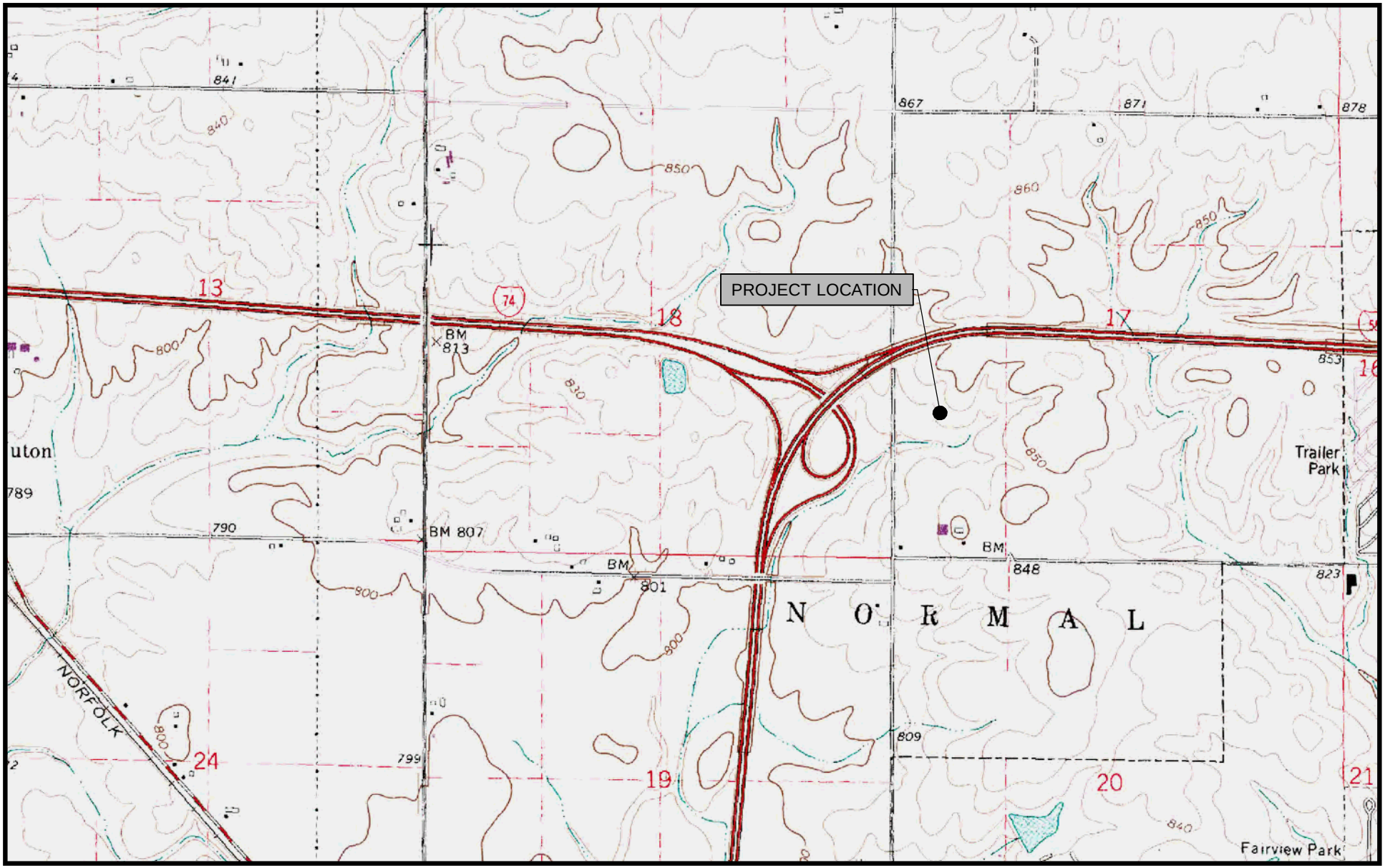
FIGURE 1. PROJECT LOCATION ON STATE MAP

STATE OF ILLINOIS TRANSPORTATION MAP, 2009

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



PROJECT LOCATION: LATITUDE: 40-32-14.39N NAD 83 LONGITUDE: 89-00-54.77W	FIGURE 2. PROJECT LOCATION ON AREA MAP	HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



PROJECT LOCATION:

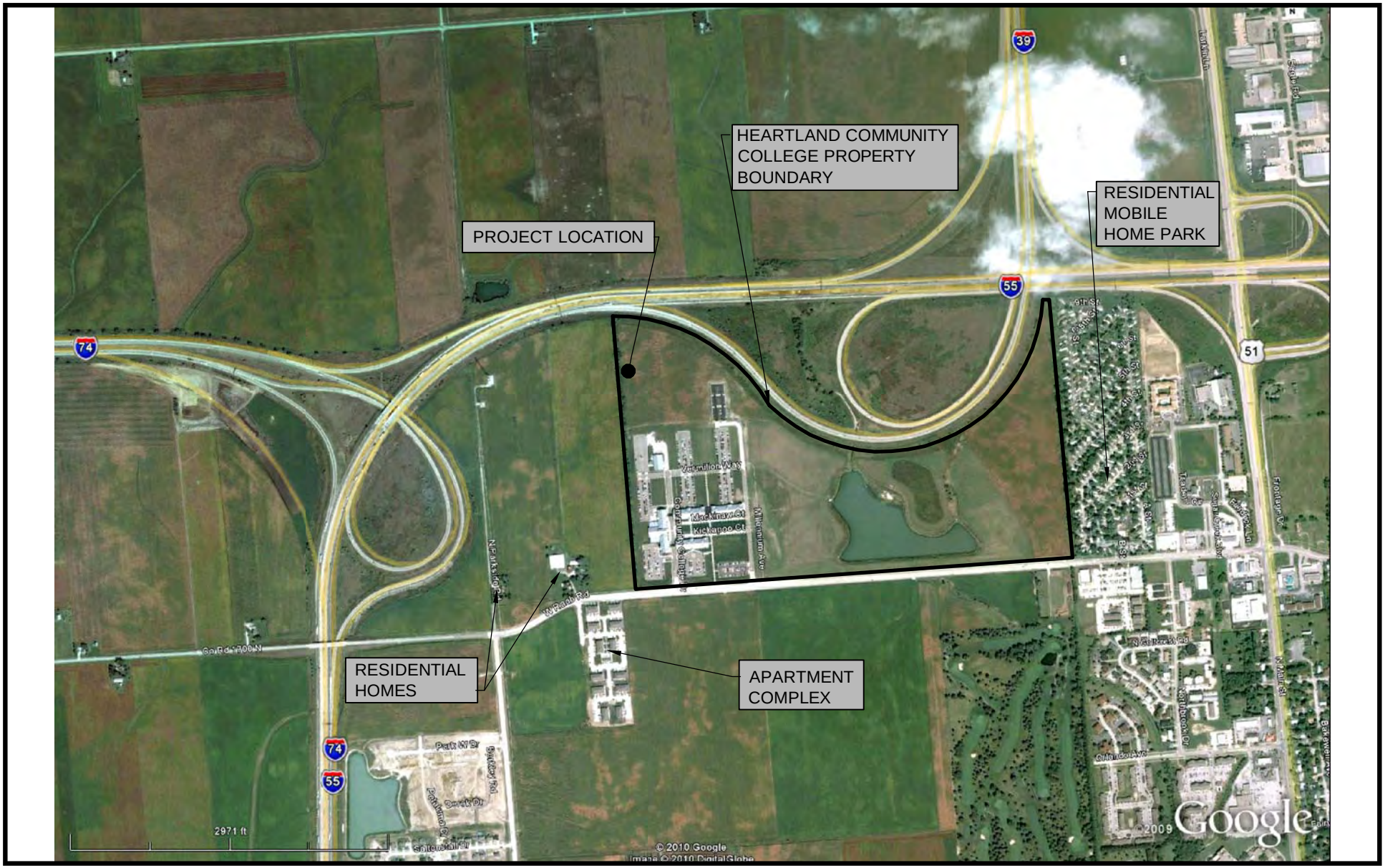
LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 3. PROJECT LOCATION ON USGS TOPOGRAPHICAL MAP

NORMAL WEST, ILLINOIS
USGS QUADRANGLE

HEARTLAND COMMUNITY
COLLEGE WIND TURBINE
ENVIRONMENTAL ASSESSMENT



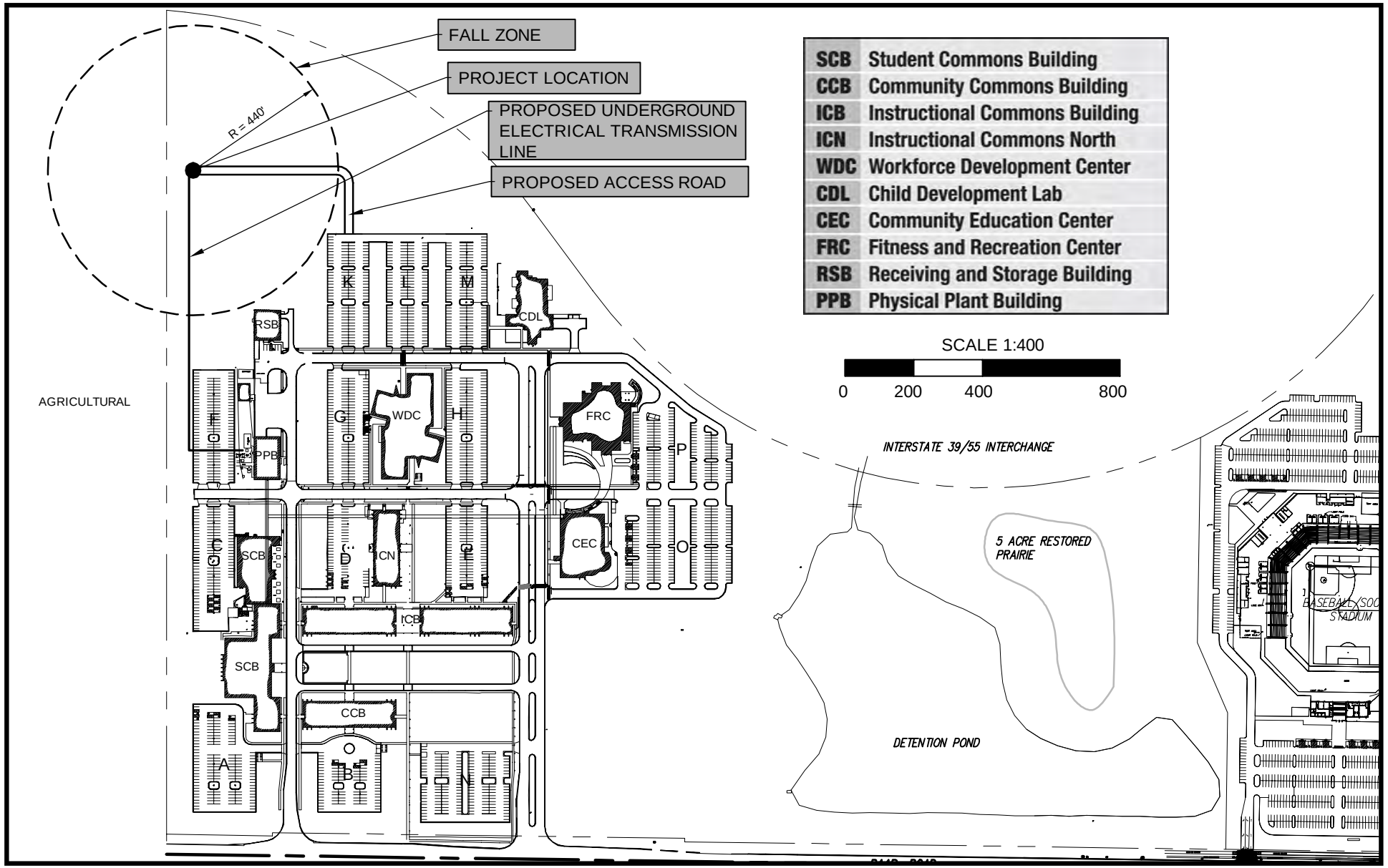
PROJECT LOCATION:

LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 4. PROJECT LOCATION ON AERIAL PHOTO

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



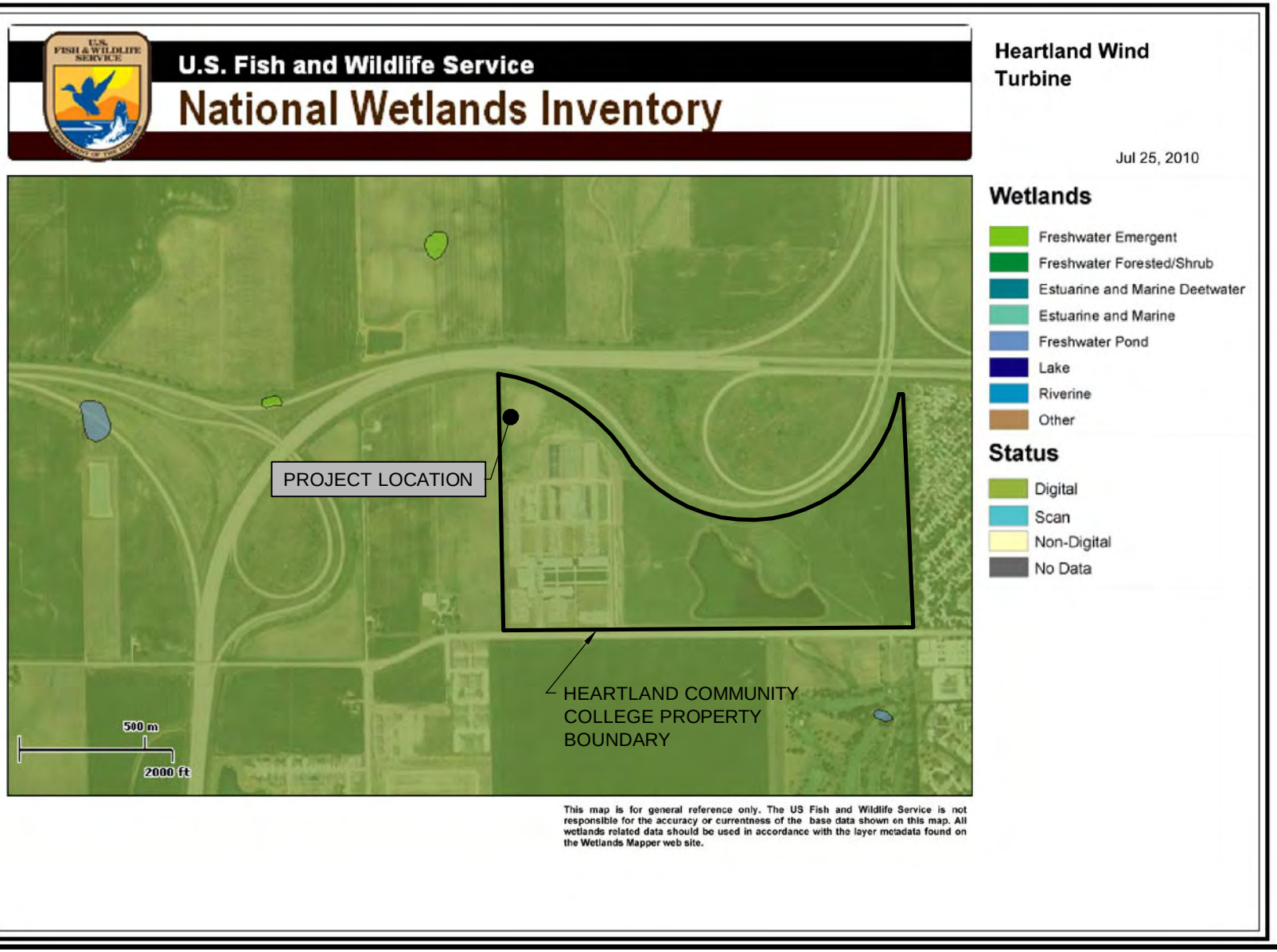
PROJECT LOCATION:

LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 5. HEARTLAND COMMUNITY COLLEGE CAMPUS MAP

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



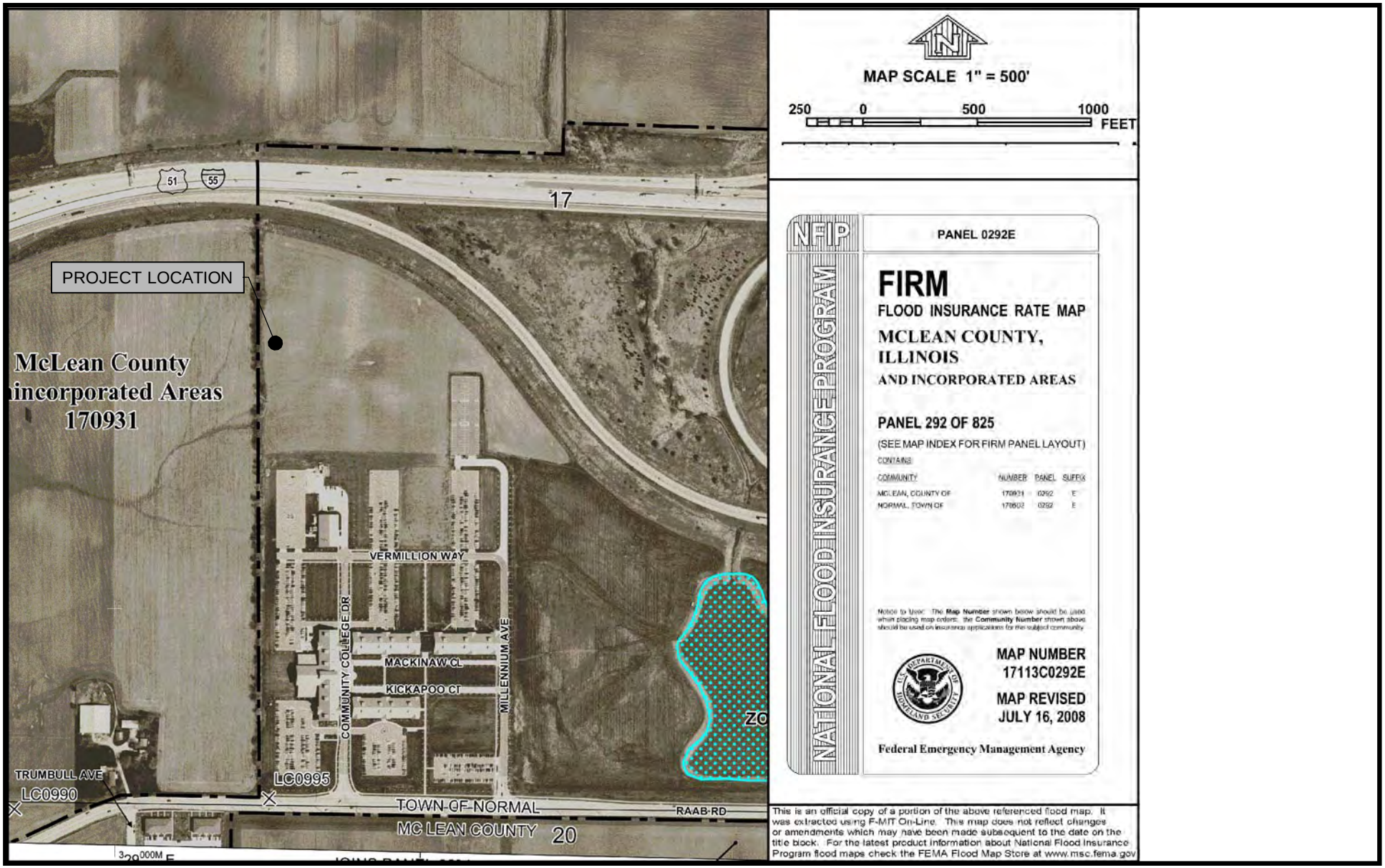
PROJECT LOCATION:

LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 6. PROJECT LOCATION ON NWI MAP

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



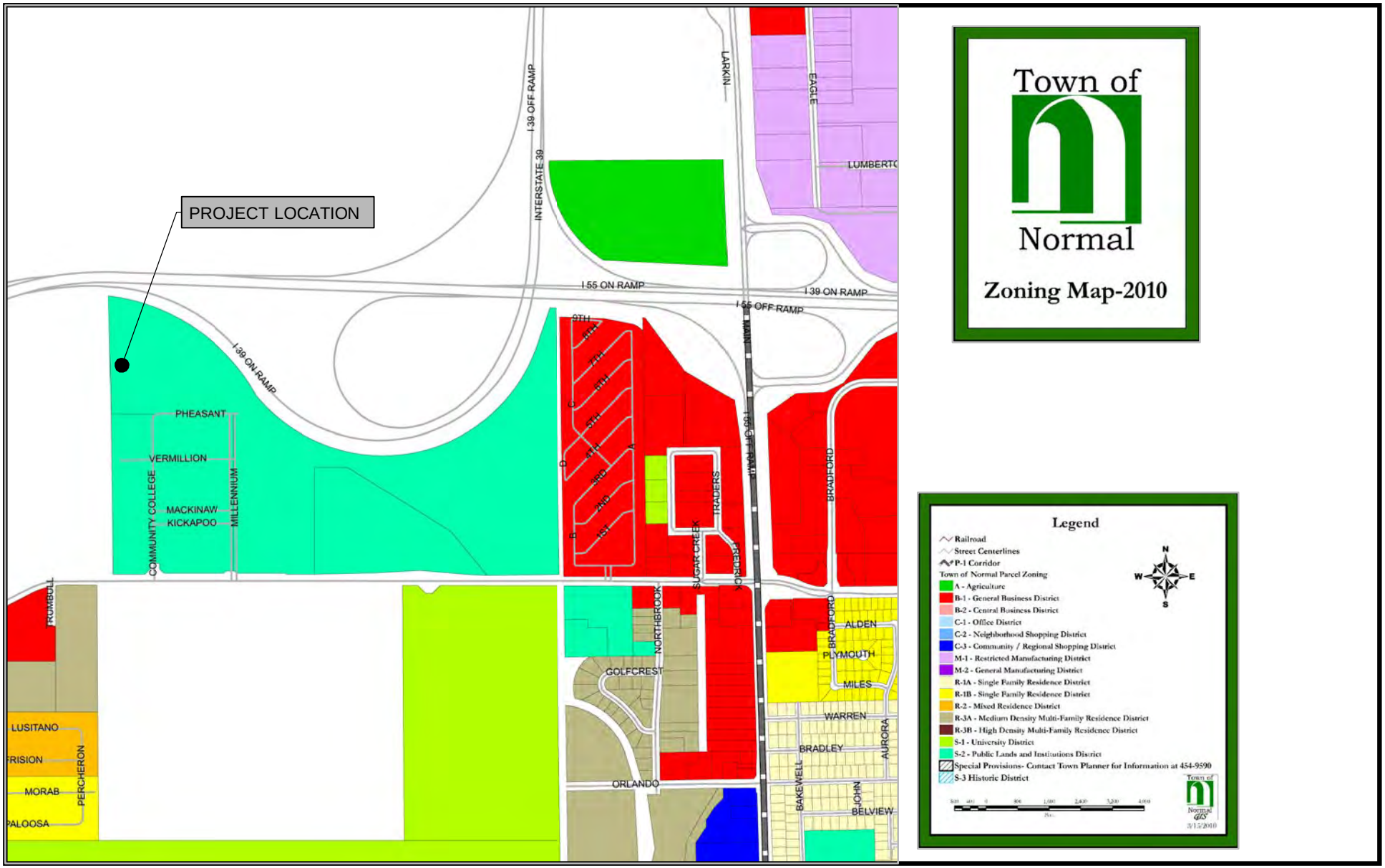
PROJECT LOCATION:

LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 7. PROJECT LOCATION ON FEMA FIRM MAP

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



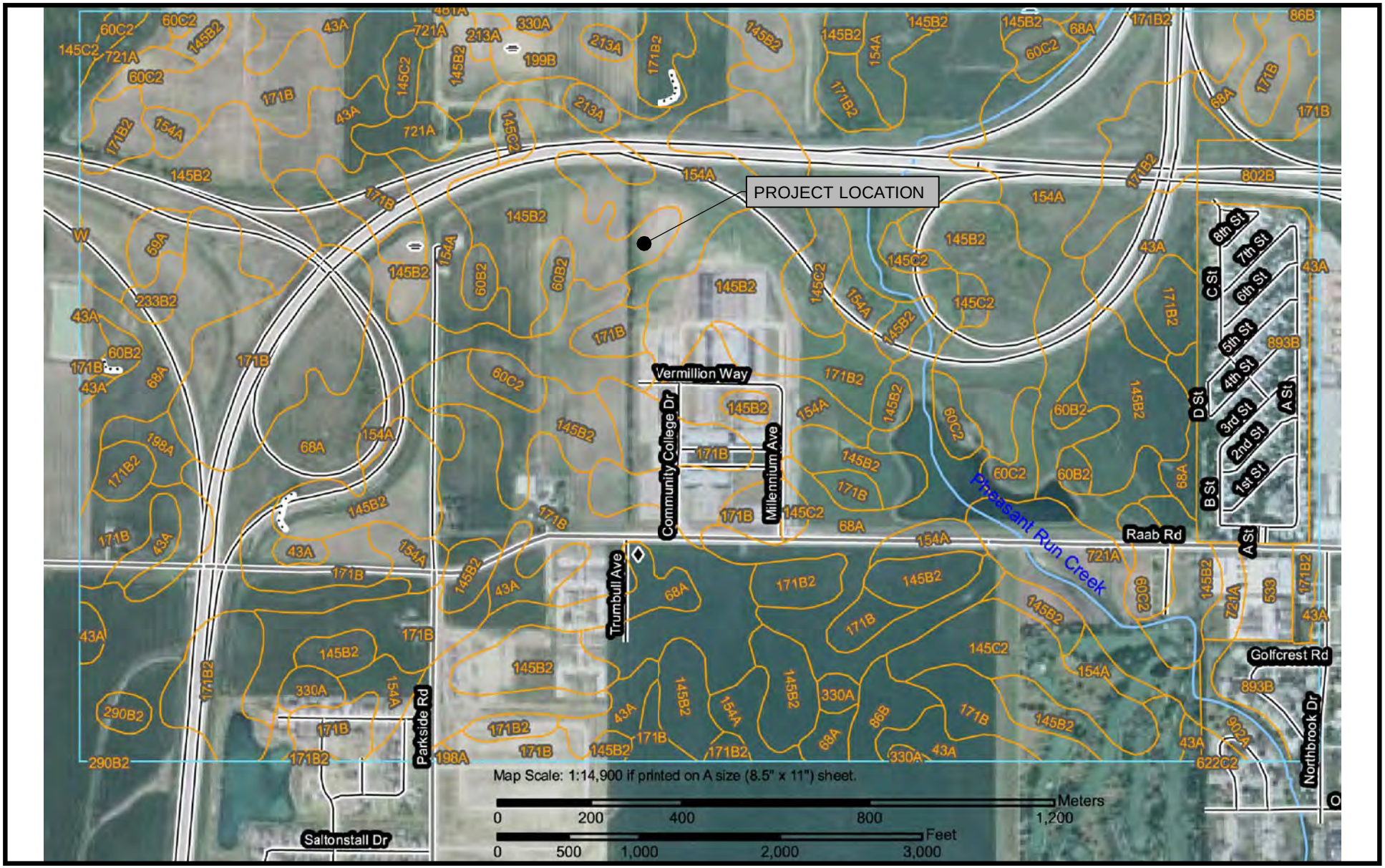
PROJECT LOCATION:

LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 8. PROJECT LOCATION ON TOWN OF NORMAL ZONING MAP

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT



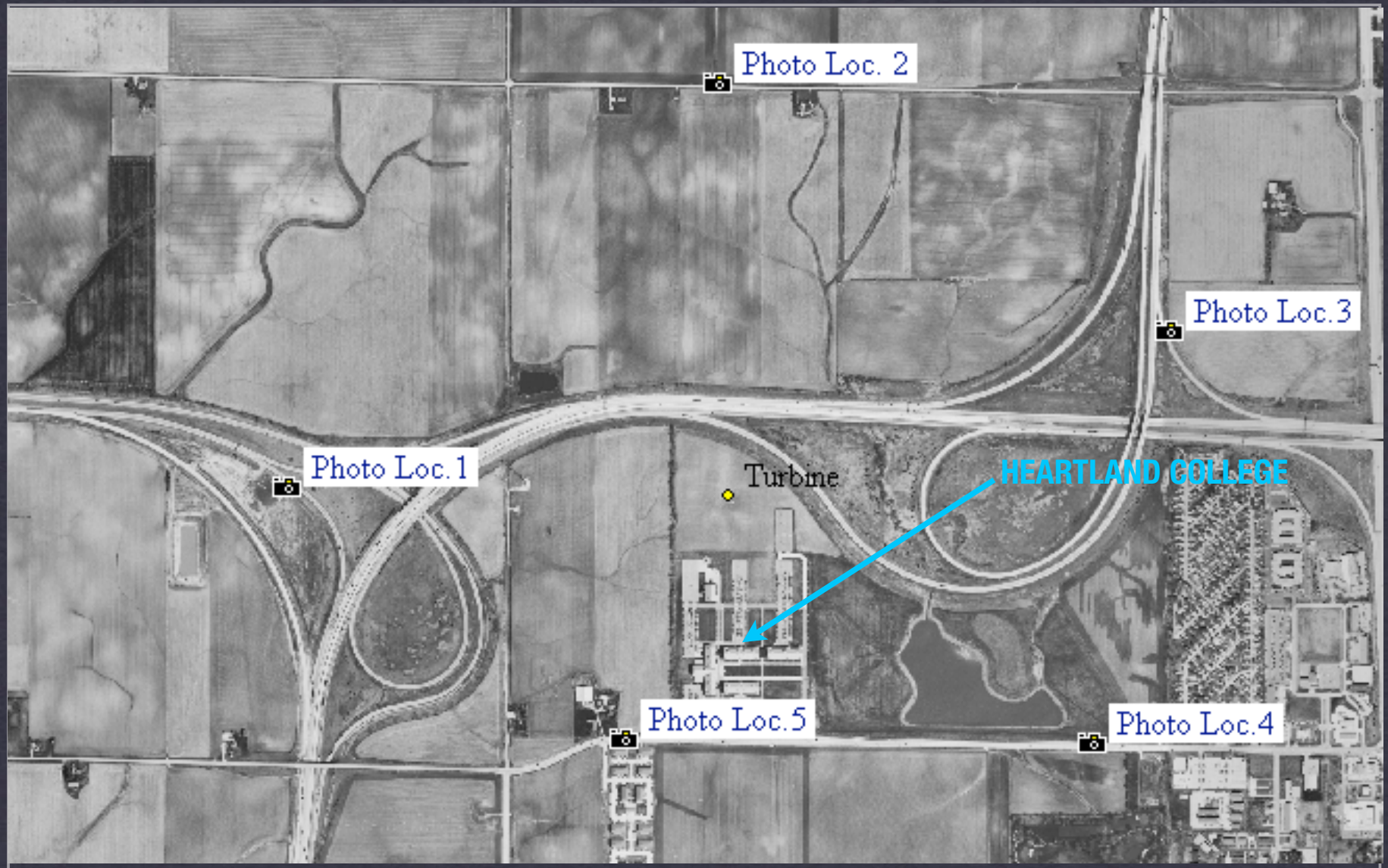
PROJECT LOCATION:

LATITUDE:
40-32-14.39N NAD 83

LONGITUDE:
89-00-54.77W

FIGURE 9. PROJECT LOCATION ON USDA SOIL AERIAL PHOTO

HEARTLAND COMMUNITY COLLEGE WIND TURBINE ENVIRONMENTAL ASSESSMENT

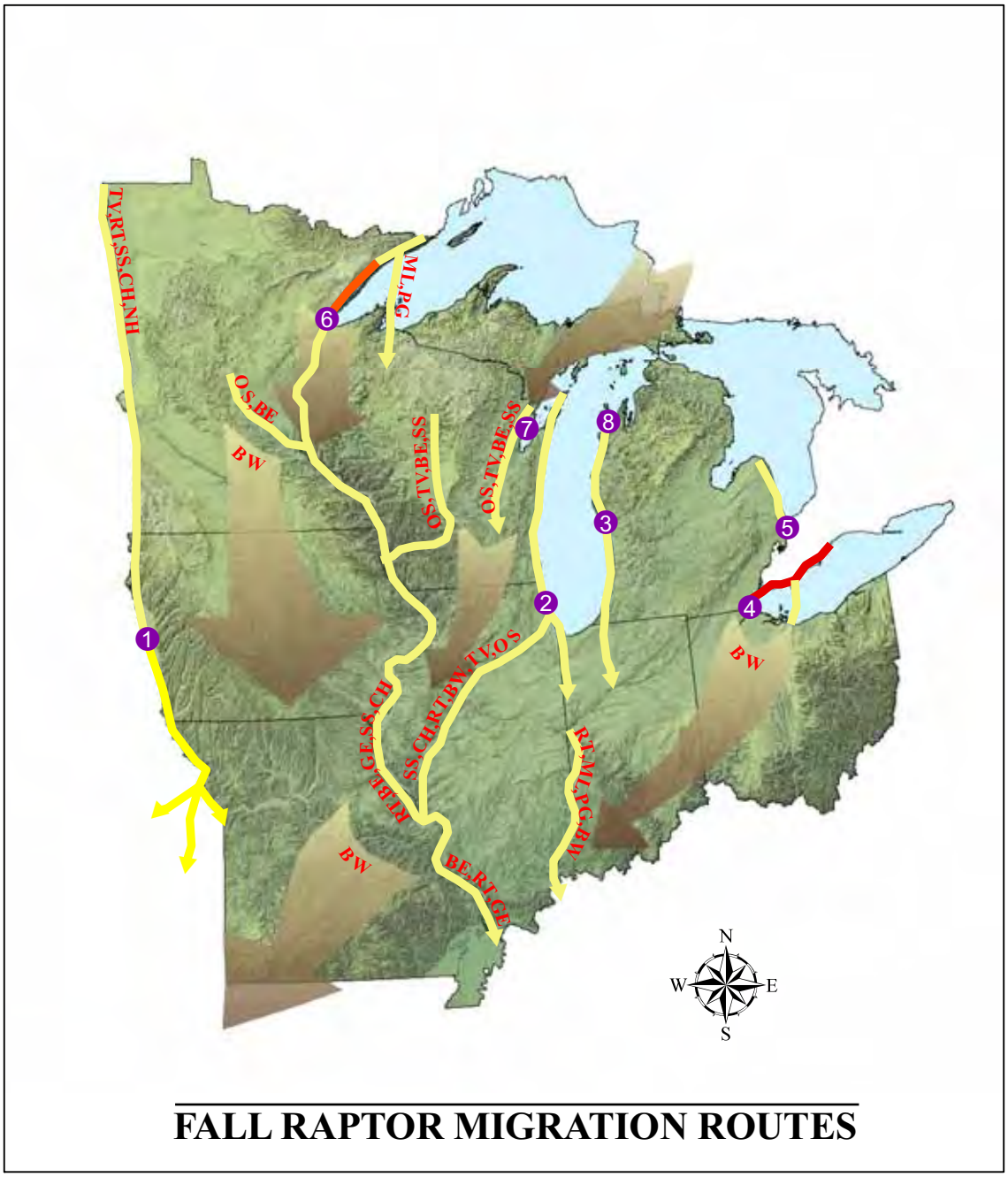


Heartland Wind Project- Photo Locations

Drawn by Wes Slaymaker, P.E.
WES Engineering Inc. July, 2010

● TURBINE

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

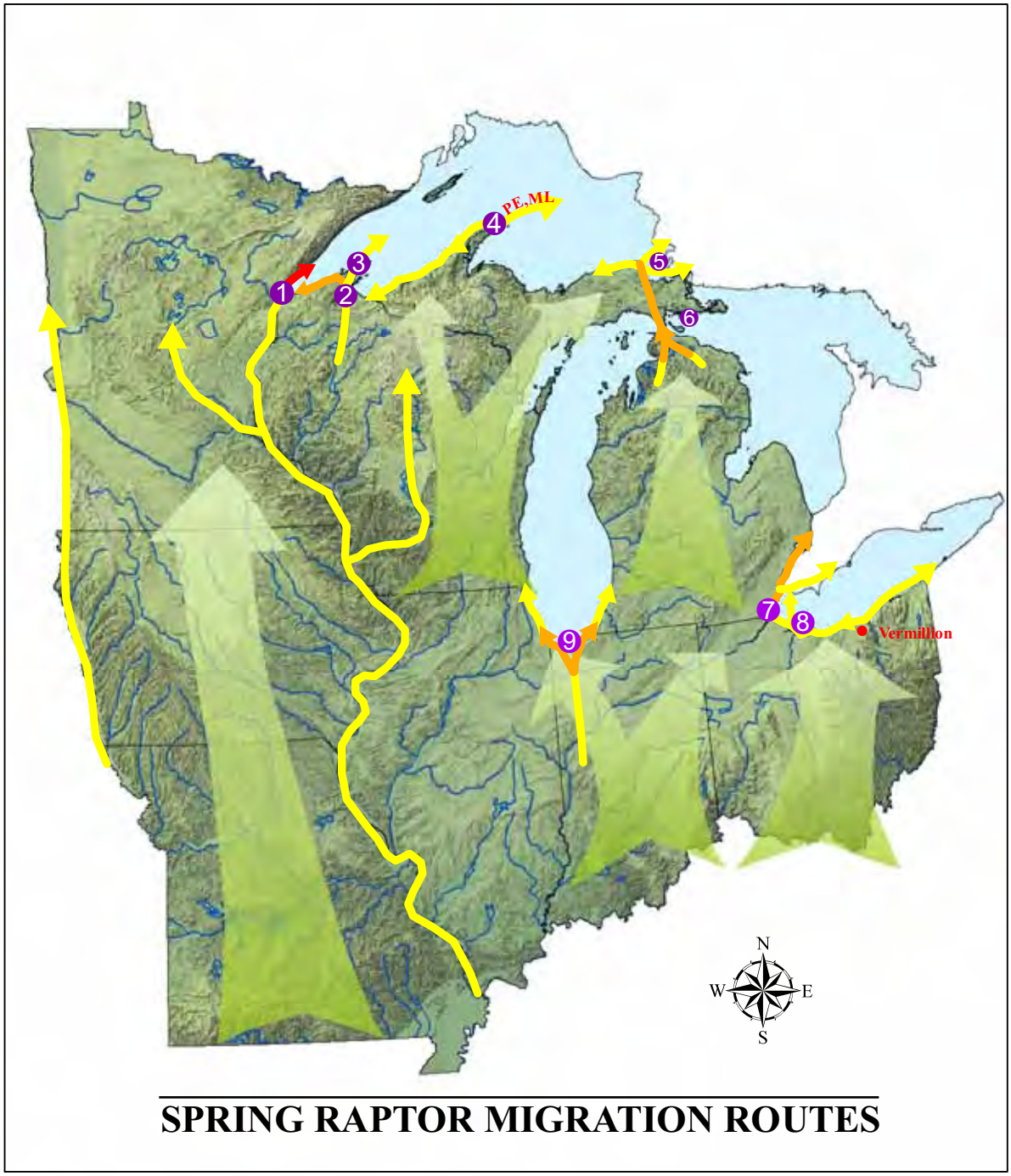
1. Hitchcock Nature Area (CH,RT,SS,TV,SW,NH)
2. Illinois Dunes State Park (ML,NH,PG,SEO)
3. Muskegon State Park (SS,RL,RT)
4. Lake Erie Metropark (TV,OS,BE,NH,SS,CH,RT, RL,GE,AK,ME,PG)
5. Port Huron (PG,ML)
6. Hawk Ridge, Duluth (TV,OS,BE,NH,SS,BW,NG, RT,RL,AK,ML,PG,BO,NSWO,LEO)
7. Little Suemico (SS,BW,NSWO)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

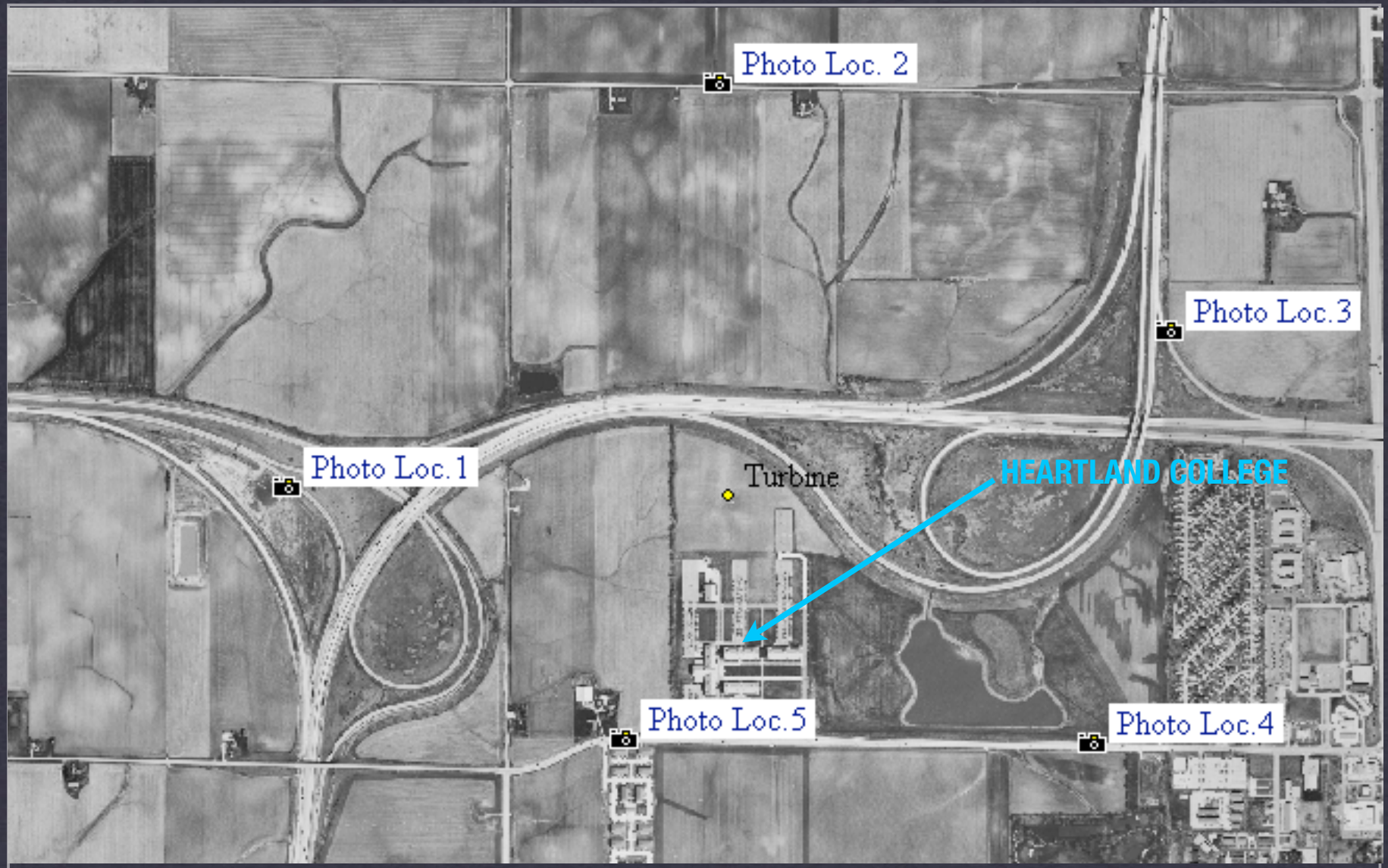
Legend
Number of Birds

- 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

APPENDIX B: VISUAL SIMULATION



Heartland Wind Project- Photo Locations

Drawn by Wes Slaymaker, P.E.
WES Engineering Inc. July, 2010

● TURBINE

Prepared for

Farnsworth Group

by: WES Engineering
706 S. Orchard St.
Madison, WI 53715

Heartland College Wind Turbine

Photo-simulation with turbine

Location 1:
Hwy 74 at Hwy 55/51
Looking East

July 2010

Prepared for

Farnsworth Group

by: WES Engineering
706 S. Orchard St.
Madison, WI 53715

Heartland College Wind Turbine

Photo-simulation with turbine

Location 2:
E. North Road
Looking South

July 2010

Prepared for

Farnsworth Group

by: WES Engineering
706 S. Orchard St.
Madison, WI 53715

Heartland College Wind Turbine

Photo-simulation with turbine

Location 3:
Hwy 55 at Hwy 39/51
Looking Southwest

July 2010

Prepared for

Farnsworth Group

by: WES Engineering
706 S. Orchard St.
Madison, WI 53715

Heartland College Wind Turbine

Photo-simulation with turbine

Location 4:
Raab Road
Looking Northwest

July 2010

Prepared for

Farnsworth Group

by: WES Engineering
706 S. Orchard St.
Madison, WI 53715

Heartland College Wind Turbine

Photo-simulation with turbine

Location 5:
Raab Road
Looking Northeast

July 2010

APPENDIX C: AGENCY COORDINATION

APPENDIX C: AGENCY COORDINATION

Attachment C-1: IDNR Response
Attachment C-2: IHPA Response
Attachment C-3: FAA Determination of No Hazard 2009

Attachment C-1

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: Heartland Community College Wind Turbine ARRA Comm REP
Project Number(s): 1006000
County: McLean

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 #:*	1006000
Contact:	Alyson Grady	Date:	02/08/2010
Address:	620 East Adams Springfield, IL 62701		

Project: Heartland Community College ARRA Comm REP
Address: 1500 Raab Road, Normal

Description: The project will construct an approx. 1.5 MW wind turbine, approx. 60 to 80 meters in height on the campus to provide renewable energy for the campus and to serve for a hands-on classroom for the college.

Natural Resource Review Results

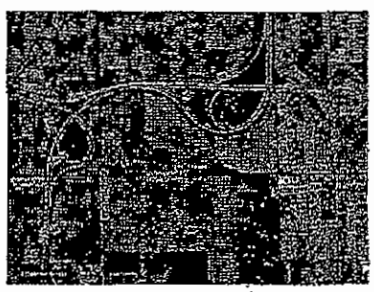
Consultation for Endangered Species Protection and Natural Areas Preservation (Part 1075)
The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water 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: McLean
Township, Range, Section:
24N, 2E, 17



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

Attachment C-2

Illinois Historic
Preservation Agency

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

McLean County
Normal
1500 West Raab Road
New Construction of Wind Turbine

PLEASE REFER TO: IHPA LOG #027032910

April 6, 2010

James E. Hubbard
Heartland Community College
1500 W. Raab Road
Normal, IL 61761

Dear Mr. Hubbard:

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

RECEIVED
APR 14 2010
HCC FACILITIES

HEARTLAND
COMMUNITY COLLEGE

March 26, 2010

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

RE: Request Consultation for Wind Turbine Project

Ms. Haaker,

We at Heartland Community College request a consultation from your agency for a wind turbine project we are pursuing. In accordance with the Community Renewable Energy Program grant requirements, which are funded through the United Stated Department of Energy, consultation with your agency is a mandate.

To assist with the processing of our request, certain documentation is required. For starters, Heartland Community College is located in Normal, Illinois. Our campus was originally constructed in the year 2000, with consultation with your agency in the year 1995. Please reference IHPA Log item #980309018PML for further information. In addition, you will find a summary page providing some of the documentation requirements, while a copy of our actual grant request will provide all other requested information for performing the consultation.

Thank you for accepting this request and we look forward to your comments. If further information is required to process our request, please contact me at (309) 268-8453 or jim.hubbard@heartland.edu.

1500 W. Raab Rd.
Normal, IL 61761
(309) 268-8000
TDD (309) 268-8030
www.hcc.cc.il.us

Sincerely,

James E Hubbard

James E. Hubbard, EIT
Director of Facilities Division

3 Atchs
1. Summary Information
2. Project Grant Request
3. Area Location/Campus Plan

CC: HCC Business Services, Institutional Advancement
IL DCEO/Mr. Wayne Hartel

SUMMARY INFORMATION

1. Funding: Department of Energy (ARRA); Consultation and Permitting: See Attachment 2, Grant Request.

2. See Attachment 2, Grant Request for complete description of project.

3. IHPA Log # 980309018PML for original campus consultation.

4. See Attachment 2 and 3, Grant Request and Area Plans for maps.

5. See Attachment 2, Grant Request for site plan; no construction specifications are done, yet.

6. Project address will be to our home address: 1500 West Raab Road, Normal, IL 61761.

No Structures; therefore:
1. Existing site conditions are that of a vacant grassy prairie. Agriculture was happening on this project site until year 2008, at which time we stopped the farming in anticipation of subject project.

2. Total acres involved with the project are less than five, but more than one.

3. There is no evidence of any prior non-agricultural disturbance at the project site.

Attachment 1

APPENDIX A
Renewable Energy Production Program
Application Cover Page

Applicant Information:

Heartland Community College	37-1271517	781283338
Applicant name	FEIN	DUNS number*
1500 Raab Road, Normal, IL, 61761-9921		McLean
Applicant address (include 9 digit zip code)		County
Project address (if different from above)		County
(309)268-8453		(309)268-7998
Telephone number		Fax Number
James Hubbard		Division Director of Facilities
Applicant project manager		Title
Jim.Hubbard@heartland.edu		www.heartland.edu
E-mail address		Websit address
Ameren IP		
Electric Utility (Delivery Service Provider)		Natural Gas Utility

Proposed Start Date: 16 May 2011 **Planned Completion Date** 12 August 2011

Project Summary:

Project Type:

- ☐ Solar Photovoltaic
- ☐ Biomass co-firing
- ☐ Biomass to Energy
- ☒ Wind Energy
- ☐ Biogas to Energy
- ☐ Other Specify:

Organization Legal Status:

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

Public Entity Type:

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

Attachment 2

APPENDIX A: (cont.)

Financial Information:

	Dollar Amount	Percent
Total grant request	$500,000	13%
Applicant & partner investment (minimum 25%)	$3,446,000	87%
Sum of other public funds (received or applied for)*	0	0
Total project cost	$3,946,000	100%

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

Job Creation/Retention (in FTE):

Categories	Jobs Created	Jobs Retained
< 1 year	8	0
1-2 years	0	0
2-5 years	0	0
> 5 years	1	0
TOTAL JOBS	9	0

*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)	3,810,600	39,401	2751
Natural Gas (therms)			
Liquid Petroleum (LP)-(gallons)			
Coal (tons)			
Oil #2 (gallons)			
Oil #6 (gallons)			
TOTAL	3,810,600	39,401	2751

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 = 0.136874 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: 1500

PMC-EF1

(7/05/12)

U.S. DEPARTMENT OF ENERGY

EERE PROJECT MANAGEMENT CENTER

ENVIRONMENTAL CHECKLIST

(To Be Completed by Potential Recipient)

PART I: General Information **DOE Project Officer:** Doug Selter **Date:** 10/26/2009

Project Title: Heartland Community College Wind Project **ST:** IL

Organization Name: Heartland Community College

Solicitation Number: Award No:

1. Please describe the intended use of DOE funding in your proposed project. For example, would the funding be applied to the entire project or only support a phase of the project? Describe the activity as specifically as possible, i.e. planning, feasibility study, design, data analysis, education or outreach activities, construction, capital purchase and/or equipment installation or modification. If the project involves construction, also describe the operation of the completed facility/equipment.
Funding to be used for overall project expenses to include design, comprehensive study, and construction.

2. Does any part of your project require review and/or permitting by any other federal, state, regional, local, environmental, or regulatory agency? ☑ Yes ☐ No

3. Has any review (e.g., NEPA documentation, permits, agency consultations) been completed?
☐ Yes ☑ No If yes, is a finding or report available and how can a copy be obtained?

4. Is the proposed project part of a larger scope of work? ☐ Yes ☑ No If yes, please describe.

Do you anticipate requesting additional federal funding for subsequent phases of this project?
☐ Yes ☑ No If yes, please describe.

5. Does the scope of your project only involve one or more of the following:
☐ Information gathering such as literature surveys, inventories, audits,
☐ Data analysis including computer modeling,
☐ Document preparation such as design, feasibility studies, analytical energy supply and demand studies, or
☐ Information dissemination, including document mailings, publication, distribution, training, conferences, and informational programs.

Preparer:	Phone:	Email:
James E Hubbard	309-268-8453	jim.hubbard@heartland.edu
Business Contact:	Phone:	Email:
James E Hubbard	309-268-8453	jim.hubbard@heartland.edu

PART II: Environmental Considerations

Section A Conditions or special areas are present, required, or could be affected by your project:

4. Pre-Existing Contamination

Pre-Existing Contamination: Land was previously agricultural, and has been changed to prairie land in the past two years.

9. Navigable Air Space

Navigable Air Space: Central Illinois Regional Airport outside five miles, but within ten miles of site.

13. Threatened/Endangered

Threatened/Endangered Species and/or Critical Habitat: Consultation will be required; unlikely anything will be found.

14. Other Protected Species

Other Protected Species: Migratory birds will be studied, since detention pond is within one mile of proposed site.

20. Public Issues or Concerns

Public Issues or Concerns: Local public sensitivity to large commercial wind farms to the north is note worthy.

23. Aesthetics

Aesthetics: Minimal effect: area has college buildings, interstate highway system, cell phone towers and rail/road lights nearby.

Section B. Would your project use, disturb, or produce any chemicals or biological substances? (i.e., pesticides, industrial process, fuels, lubricants, bacteria)

3. Chemical Storage, Use, and Disposal

☐ Permit Required Quantity: limited Permit Type:

Specific nature of use:

Project will use lubricants and solvents during construction and operation of the wind turbine generator.

5. Hazardous, Toxic, or Criteria Pollutant Air Emissions

☐ Permit Required Quantity: temporary Permit Type:

Specific nature of use:

Criteria pollutants may be released during the construction of this project and transport of the equipment.

6. Liquid Effluent

☑ Permit Required Quantity: temporary Permit Type: General NPDES

Specific nature of use:

Stormwater general NPDES permit will be sought and GMP applied throughout the period of construction.

8. Hazardous Waste

☐ Permit Required Quantity: limited Permit Type:

Specific nature of use:

Potential exist for generating HW, primarily in the areas of lubricants and solvents.

Section C. Would your project require or produce any radiological materials?

Update | Print Form | Return to Main Menu

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.

Authorized Official (signature*)	(309)268-8106
Rob Widmer	Telephone
Typed/Printed Name	(309) 268-7999
Vice President of Business Services	Fax
Title	10/26/09
371271517	Date
FEIN Number (9 digits, Federal Employment Id Number, does not start with "E")	Heartland Community College
1500 W. Raab Road	Applicant
Authorized Signature Address	
Normal, 61761-9921	
Authorized Signature City, 9-digit Zip (find 9-digit zip at http://zip4.usps.com/zip4/welcome.jsp)	
Rob.Widmer@heartland.edu	
Authorized Signature E-mail Address	

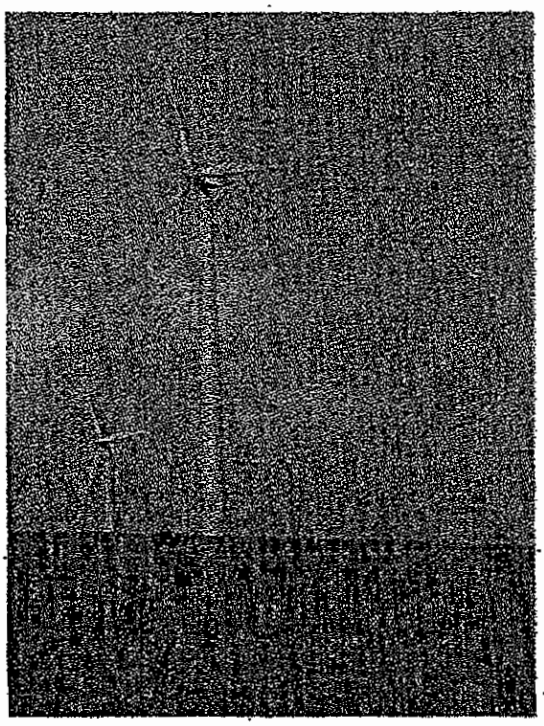
*Electronic signatures not acceptable. Please supply Certifications (this page) with original signature via mail, fax or electronically (scanned document)

APPENDIX B

State of Illinois
Department of Commerce and Economic Opportunity

ARRA Community Renewable Energy Program

Heartland Community College Wind Project



October 26, 2009
by: Heartland Community College

Table of Contents

Section 1
Profile of applicant organization and key partners

The wind project proposed by Heartland Community College is a single turbine 1.5 megawatt (MW) wind project in McLean County. The proposed project is a "Wind Facility" that will generate electricity for use in deferring fossil fuel energy consumption by Heartland Community College (HCC).

Founded in 1991, Heartland Community College is an open admissions two-year college located in the central Illinois community of Normal, Illinois. It serves approximately 5,000 students seeking credit courses resulting in either degrees or certificates and an additional 6,000 in non credit classes for professional or personal growth. Enrollment has increased at the college above national rates for the past five years and has grown over 20 percent since 2000. The demand for the college continues to rise based on local trends of both local high schools student populations in the district as well as the local business community's needs for new technology training and qualifications. The College is governed by a locally elected Board of Trustees.

Heartland has community support from many local community partners including State Farm Insurance, COUNTRY Financial, Caterpillar, Mitsubishi Motors of North America and Verizon. Their support of the college and Foundation, when combined with others in the area has resulted in over $2.5 million invested in educational and organizational goals at the college since 2000.

Heartland's mission is "to provide access to higher education and excellence in teaching and learning." In support of this mission, the college employees over 400 staff and faculty to serve student needs. This commitment leads to a 19:1 student to teacher ratio average for credit classes. One third of all students attending the school receive some form of financial aid. In 2008, the average age of a Heartland Community College student was 25, with two thirds of the student population being under that age. Significant growth exists in the "traditional" college student age, with that population growing 30 percent in the past four years. In 2007 alone, one out of every five district high school graduates enrolled at Heartland. More than half of the student population are the first in their immediate family to attend college.

Heartland is home to the Workforce Development Center, which is the first state-funded, LEED certified (Leadership in Energy and Environmental Design) building, which earned a LEED silver rating. Heartland's planned campus expansion will increase the size of the campus by 50 percent by the year 2011, and HCC is committed to adopting principles of sustainable design into all new construction projects. Various community leaders including State Farm Insurance, COUNTRY Insurance and Financial Services, Caterpillar, and Mitsubishi Motors Manufacturing support this initiative both in principal and financially.

Primary partner organizations that were selected and have agreed to participate in the proposed project include Alternate Energy Solutions, Inc. of Eastpointe, Michigan, Farnsworth Group, Bloomington, IL, Wes Engineering, Madison, WI, BRiC Partnerships, Belleville, IL, and an ESCO yet to be determined. The primary role of each partner was/is initial data gathering and assessment, foundation design, feasibility and comprehensive study, ESCO evaluation and recommendation, and financial development and life cycle monitoring.

Section 2
Expertise/qualifications of applicant organization and key partners

There are several professionals assisting the project development. These professionals include the following:

Heartland Community College Project Manager – Lieutenant Colonel James Hubbard, EIT, Lt Col (USAF – Ret), Division Director of Facilities at Heartland Community College. Colonel Hubbard completed a 24-year career in the United States Air Force in the Civil Engineering field. He is experienced in construction, energy and environmental management, as well as physical plant and civil works operations. He has been with Heartland Community College since August 2006, and has been at the ground level of this project since inception. His duties will encompass overall management of the project including design, purchasing, permits, waivers, zoning variances, utility agreements, financial development, and any other implementation elements.

Mr. John Wolar - Alternate Energy Solutions was incorporated in February 2003 as a Michigan Corporation. The company was formed by technical educators for the purpose of assisting educational and municipal institutions in evaluating potential utilization of renewable energy for the reduction of energy expenditures and to facilitate project development on behalf of clients that choose to pursue renewable energy systems integration. The company has been working on wind energy with clients in Indiana, Illinois, Michigan, Montana, and the province of Ontario, Canada.

The Farnsworth Group is a full-service engineering firm with the ability to complete any project. Services provided by their municipal engineers range from small studies to long-term improvements such as wind turbine foundations. For large or specialized projects, Farnsworth Group combines the talents of its entire staff – i.e. civil, environmental, transportation, mechanical, electrical, structural, landscape architecture, and surveying – to ensure project needs are met.

Individual ESCOs are yet to be selected, but will have the requisite experience for developing such a wind turbine project. Likely candidates include Honeywell, CTS,

Johnson Controls, Siemens, as well as any other ESCO responding to an energy savings performance contract Request for Proposal.

Mr. Wes Slaymaker, P.E. of WES Engineering LLC is a Professional Engineer, provides technical assistance to the project including wind and energy analysis, project design and permitting support. WES Engineering brings significant experience to the project derived from work on numerous wind projects in the Midwest, many now operating for several years. Mr. Slaymaker has 9 years of experience working in the wind turbine business. He has worked for three wind developers in the Midwest (Navitas, enXco, and EcoEnergy), and assisted in all aspects of the development of wind turbine projects ranging from a single 35 kW turbine in rural Minnesota, to a 100 MW wind turbine project in Northern Illinois. Mr. Slaymaker's duties included the installation and monitoring of wind measurement equipment, project design, turbine layout, permitting, electrical interconnection, and wind and energy analysis.

BRiC Partnership, LLC, located in Belleville, Illinois, was formed in 1985. BRiC engineers are highly knowledgeable specialists in mechanical, electrical, plumbing, fire protection and system technology disciplines. Markets serviced by BRiC include secondary and higher education, health care, corrections, industry, and government. BRiC has an engineering staff of 34 professionals. The company's eight professional engineers are licensed in the States of Illinois, Missouri, Arkansas, Georgia, Indiana, Kansas, Kentucky, North Carolina, and Wisconsin. Duties will primarily be initial ESCO proposal evaluation and selection consultation as well as project commissioning agent.

Section 3
Project description

Project Overview – The Heartland Community College Wind Project, is a project in Central Illinois McLean County owned by Heartland Community College and located on its main campus in Normal. The planned project consists of one large wind turbine installed on a 60-80 meter tower. The turbine will offset roughly 53 percent of the current day electrical usage of the College as well as provide a hands-on classroom for the Heartland Community College Applied Maintenance Renewable Energy Technician program.

Project Goals / Objectives- The College is interested in both reducing its carbon footprint with a visible renewable energy project, and providing a hands-on training facility for renewable energy technicians. Central Illinois is populated by no less than three major wind farm developments by Horizon, Invenergy, and Navistar with a total of several hundred turbines. Future graduates of Heartland Community College will be the technicians responsible for maintaining and operating these turbines.

Project Location – The project is located on the main campus of Heartland Community College on the northwest edge of the Town of Normal, McLean County, Illinois. The project site is located in the northwest corner of the 160-acre campus, just south and east

of the Interstate Highway I-55 and I-74 interchange. Wind data measurements were collected at north 40 degrees 32 minutes 17 seconds, and west 89 degrees, 0 minutes and 58 seconds, at 856 ft ASL. The site is surrounded to the north and west by the interstate and agricultural fields, and to the south by an apartment complex nearly one-half mile away. Small trees line the property to the north and west separating the College property from the agricultural fields.

Interconnection – The project proposes to interconnect to a College transformer and automatic switch gear bank via underground cabling. The automatic switchgear bank will be aligned through a paralleling agreement with the local electric utility, Ameren IP.

Project Design – A final turbine selection has not been made, but several choices such as GE and Vestas are being considered given the local installation of such equipment by wind farm developers in Central Illinois. The project will consist of one large wind turbine in a size near 1.5 MW as was recommended in the preliminary wind analysis. The equipment will be installed at 60-80 meters, and will be interconnected via underground cables into the College electrical system.

Project Output - The forecasted production for this project is approximately 3,810,600 kWh per year.

Project Schedule - The current schedule for completion of development activities, facility construction, and commercial operations of the project is shown in the following table. This schedule is subject to certain key external variables such as the timely execution of project transaction documents, including the utility paralleling agreement, and potential county zoning variances.

Schedule of Milestone Events	
Milestone Event	Anticipated Completion
Project Design	May 2010
Licensing/Permitting	August 2010
Complete Project Financing	February 2011
Commence Construction	May 2011
Start-up Testing	August 2011
Commercial Operations Date	September 2011

Technology – Technology selection will be based on several factors, including potential site limitations which may limit height, and the Central Illinois wind farm developer turbine selections which take priority. Obvious selection criteria will also include availability, price and quality.

Permits - The project will require a county and potentially municipal Special Use Permit. The Project will comply with McLean County's conditions for setbacks and anticipate these and other conditions applied will be reasonable for this project. Considerations include setbacks from occupied residences of 1.5 times the structure height, and a minimum setback from roads of 1.1 times the tower height. Attachment 3 contains a table of permits required and the schedule to obtain them. Aviation issues have been reviewed and no effect to navigable airspace appears to exist in this area for a wind turbine of approximately 389' in height.

Project Description

Location of Project and Site Description - The project is located in McLean County, Illinois. See illustration below for overview location.

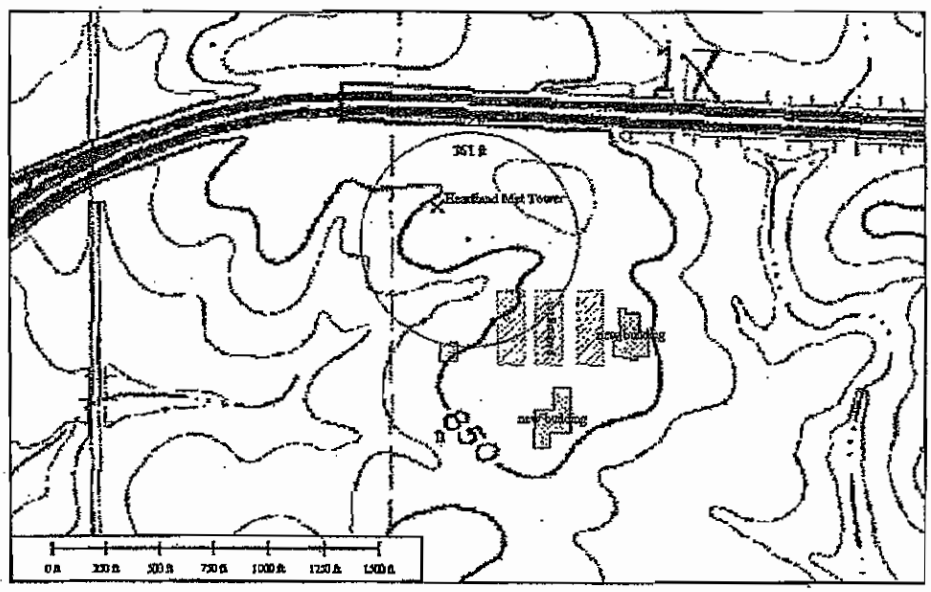


Figure 1 - Project Area- Topographical map

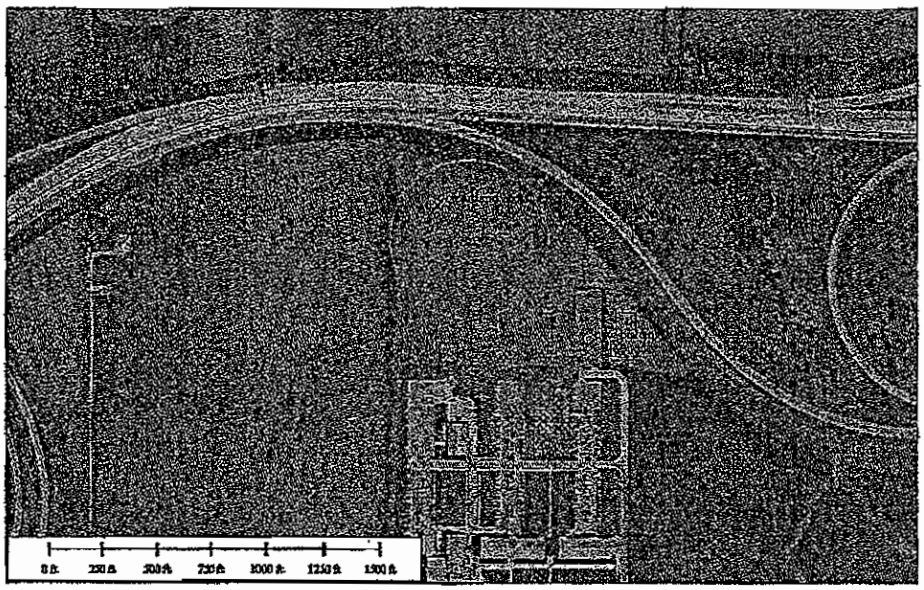


Figure 2 - Project Map- Aerial photo (Yellow ring - 1.1X, green ring – 1.5X)

Energy Analysis - The energy analysis for this project was prepared using wind speed data obtained from a wind measurement tower on site at the same general location as planned for the turbine. This 50 meter tower was installed in July 2008 and continues to operate to this day. The project engineer used various software tools to create the attached set of analysis and estimated energy output from the project (Attachment 1).

System Installer / Contractor – The specifics of the turbine manufacturer, project details, and contractor for installation will be determined in the coming months as the project is fully developed.

Section 4
Project Benefits

The wind project will provide several quantifiable benefits to the community including temporary construction and long term operations and maintenance jobs, controlled carbon fuels usage growth through increased renewable energy reliance, enhanced management of the district taxing growth, and increased numbers of available maintenance technicians.

The job creation impact of the project is calculated using the results of an extensive report entitled "Economic Impact, Wind Energy Development in Illinois, June 2009" produced by the Center for Renewable Energy at Illinois State University. In that report, the average construction jobs created per installed megawatt (MW) is 5.38 and 0.26 for

permanent jobs. Smaller projects, such as the Heartland Community College project is, will have nearly double that effect due to a similar amount of work required for a project but fewer MWs over which to spread the impact. Using double the average impact, yields jobs creation impact of eight during construction and one during the operational phase of the turbine facility life. Faculty and administrative staff to employ the Applied Maintenance Renewable Energy Associate Degree are already employed by the College for application of the technical hands-on training. Number of jobs created after project completion will be the measure of verification.

Energy usage will continue to increase as the campus grows over the coming years. This project will assist in slowing the increase in carbon fuels usage by relying more on renewable energy produced by this project. Heartland Community College main campus currently uses over 7,000,000 kilowatt hours per year. The projected wind turbine production is 3,810,600 kilowatt hours per year. Thus, the College will effectively reduce its carbon fuels usage for electricity by roughly 53 percent in the first year of production and carbon dioxide reduction will reach 2,751 metric tons. However as the College continues to grow, the percent of carbon fuel offset by renewable energy will reduce. At that time the College will consider additional alternative energy saving projects. Carbon fuels kilowatt hours used per square footage served is the unit of measure for verification.

Heartland Community College is one of 39 public community college districts in Illinois. As a public taxing body, the College has been able to maintain a relatively low tax rate during the first 19 years of existence. During this time, energy costs have continued to rise for the College both as a function of total usage and cost per kilowatt. This project will help curb the cost growth of energy for the District by avoiding the purchase of 3,810,600 kilowatt hours of electricity in the first year of turbine production. The College budgeted roughly $1.25 million dollars in fiscal year 2011 for energy needs; electricity is over half of the cost. Cost of carbon fuels used per square footage served is the unit of measure for verification.

Currently there is no wind turbine training facility within the Central Illinois region served by Heartland Community College. The College began a Renewable Energy Associate Degree in Applied Maintenance in the fall of 2009. This program was developed in response to current and future local market demand for workers trained in renewable energy systems, such as wind turbines. Completion of this program will make residents marketable for a successful career in the local wind energy industry. The number of graduates working in industry will be the measure for verification.

Section 5
Project Budget

The total cost of the project is estimated at approximately $3.95 million dollars. The following table presents the basis of the cost estimate. Most of the equipment and construction costs listed have been obtained from similar projects in the area which were

bids from qualified contractors/suppliers in the Spring and Summer of calendar year 2009. Financing costs were obtained from firms that have been used in past for project bond finance. The cost of the project will be funded primarily through a performance contract which may require third-party financing and a payback less than 20 years. The balance of the project will be funded by other sources including grants, institutional reserves, or funding bonds.

Schedule of Project Costs

Classification	Item	Cost
Equipment		
	Turbine, towers, blades, transformers	$2,550,000
Construction		
	Electrical, foundation and civil	$1,036,000
Development		
	Permitting, project management, legal	$65,000
Contingency		
	Five percent for variances in conditions or pricing	$200,000
Engineering		
	Foundations, Electrical, Civil design	$95,000
Financing		
	Financing Costs	$100,000

Eligible costs include the equipment and construction categories above.

Attachment 1- Wind and energy estimates

1. Executive Summary

Alternate Energy Solutions, Inc. ("AESI") was engaged by the administration of Heartland Community College ("Heartland") to purchase, assemble, erect and maintain one 50m XHD meteorological tower manufactured by NRG Systems, Inc.; for the purpose of monitoring, recording and evaluating collected wind data. Wind data collection activities are for the purpose of investigating the viability and practicality of the local wind regime for possible future integration of a wind turbine generator (WTG) to generate electrical energy and offset a portion of the base electric load of the college. Our evaluation finds that the local wind regime is suitable for wind power development, provided, turbines designed for medium wind velocities are used and the initial capital cost (ICC) for the project is carefully controlled through thorough pre-engineering design and prudent project work-scope definition and bidding.

One site was selected on campus for wind meteorological tower monitoring and is identified as HCC-1. Construction of the meteorological tower began during the month of June 2008. Data recording began July 4, 2008 and continues to the present day. One calendar year of data was collected prior to the writing of this report. Data was validated against local meteorological sources believed to be accurate. The average annual 50 m level wind velocity recorded at HCC-1 was 6.30 m/s (14.1 mph) yielding an approximated wind power density of 267 w/m^2 for the time period studied.

Wind power density at HCC-1 would be traditionally categorized as a Class II wind regime. The reader of this report should be mindful that technological improvements in wind turbine generator design and rotor efficiency give Class II wind regimes improved stature as viable wind resources. As the price of electrical energy tends to increase, low wind regimes become more viable and acceptable resources for wind generating assets and infrastructure. Additional considerations should include the present and future cost of electrical energy, measured wind velocities compared to historical wind velocities, financial impact of federal and state carbon emission regulations, improved operating efficiencies of new wind turbine technologies with higher rotor hub-heights, and stewardship to our environment.

Four years of historical wind data was compiled using NCDC data from Normal, IL and compared against the recorded wind velocities from HCC-1, beginning with February 2005 through August 2009. Because of the limited local dataset, the data from WBAN FAA/AWSS Station No. 54831, located at Central Illinois Regional Airport – Bloomington Normal (KBMI), was used to identify local events such as icing. Due to the limited dataset from KBMI, a 20 year dataset from WBAN FAA/AWSS Station No. 93822, located at Springfield Capitol Airport (KSPI), was acquired for intermediate-term correlation of wind velocities with HCC-1.

Using the compiled data, an initial list of wind turbine generators in the 1.5 MW (1,500 kW) nameplate rated class was compiled for evaluation using the actual tower data. The International Electro-technical Commission Wind Turbine Survival Standard (IEC Standard 61400) was the reference used against compilation process.

For this study, the wind turbines are presumed to be placed on 80 m (262.4 ft.) towers. The Federal Aviation Association (FAA) and local airport authority (having zoning jurisdiction and ordinance interpretation for Central Illinois Regional Airport) may influence the ultimate location for the project and invoke regulation on tower obstruction lighting.

Computations infer that the average annual wind velocity for the recording period fell into the range of 6.95 m/s (15.5 mph) to 7.24 m/s (16.2 mph) for 80 m hub-heights; based on extrapolation of the data recorded data from the HCC-1 meteorological tower. Correlated intermediate-term data suggests that at 80m projected P_{50} wind velocities could range from 6.36 m/s (14.2 mph) (pessimistic) to 6.79 m/s (15.2 mph) (optimistic). For this executive summary, projected P_{50} wind velocities were applied to wind turbine manufacturers' power curves and yielded gross energy capture estimates ranging from 3,877 MW-h to 4,415 MW-h, for a typical 1.5 MW wind turbine generator. This equates to gross capacity factors ranging from 29.4% to 33.5%. The capacity factors given in this report are derived from gross generation calculations using an AAER A-1500-77 wind turbine. Wind velocities, power curves, hub-height and other factors will affect a wind turbines gross and net energy capture.

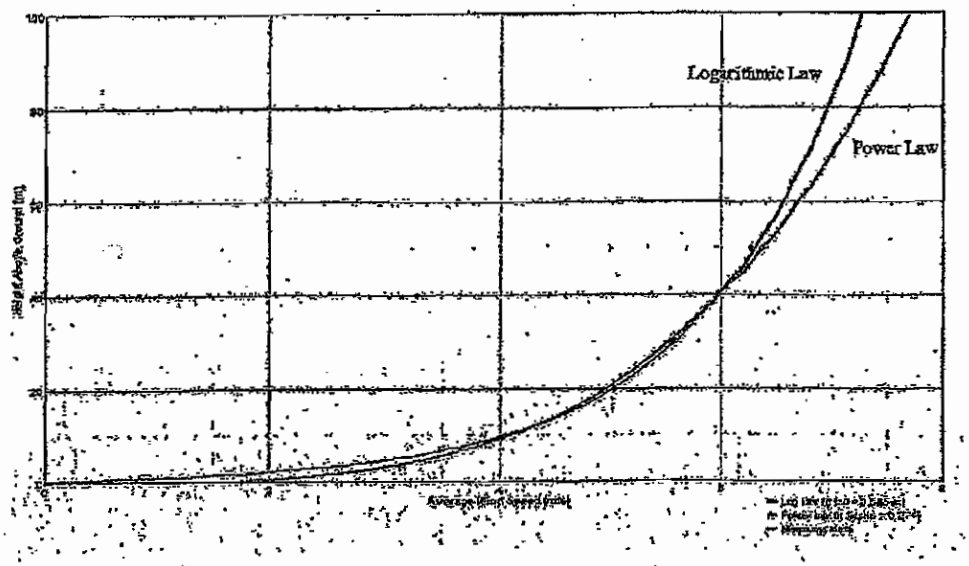
It is important to note that the P_{50} velocities fall marginally below of those wind velocities expressed on wind maps commissioned by Illinois Clean Energy and AWS Truewinds. For example, AWS Truewinds estimates the wind velocity to be 7.21 m/s at 80m in the study region. Excluded from the gross capacity factor computations are potential losses that could occur due to blade soiling, icing of rotor, transmission and distribution line loss, and maintenance (both scheduled and unscheduled). Net Operating Losses generally fall in the range of 5% to 13%. Potential losses are dependent on factors outside the scope of this study.

As part of this study, we were directed to place emphasis on availability of wind turbines for a possible commissioning date in the fall of 2010. The matter of initial capital cost (ICC) expenditures for manufactured wind turbines, project infrastructure and construction, and other ancillary costs, were estimated and based on our knowledge of other projects. The ICC estimates were used to determine the

unit cost of energy (UCE) for a proposed single turbine facility. Extensive cost estimating tasks were not undertaken in the composition of this document; and, are generally a part of a formal project pro forma.

We estimate the installed cost of a single 1.5 MW wind turbine installation with an 80 m hub-height at $3,206,638.00 or $2,1138/kW for prudently designed and bid projects; projects bid as ECP contracts will typically command an additional project risk premiums of 8% to 15%. Unit cost of energy is estimated at $0.04036/kW-h to $0.04538/kW-h, using P_{75} wind velocitites, with the cost of maintenance included and estimated at $0.005/kW-h. The cost of maintenance will be determined by the manufacturer and Heartland and will reflect the scope of service and coverage to be provided.

Vertical Wind Shear Projections HCC-1



Elevation	Logarithmic Law	Power Law
80m	6.95 m/s (15.5 mph)	7.24 m/s (16.2 mph)
100m	7.26 m/s (16.2 mph)	7.69 m/s (17.2 mph)

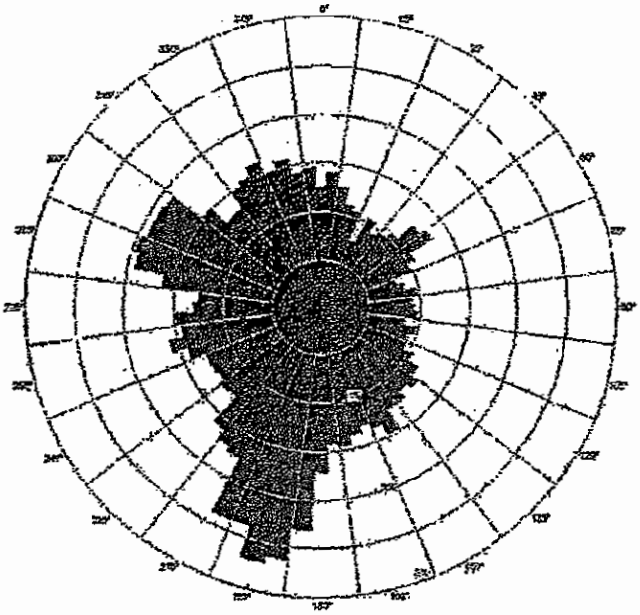
Tabular Representations

Wind Resource Summary for HCC-1
(07/04/2008 to 07/15/2009)

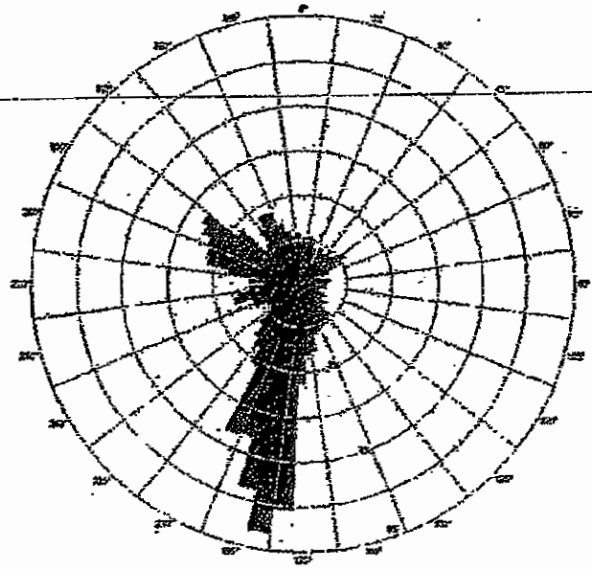
Metered Level	50m A	50m B	40m	30m	20m	10m
Mean Wind Speed (m/s)	6.25	6.36	5.91	5.57	5.03	4.05
Median Wind Speed (m/s)	5.80	6.00	5.50	5.10	4.50	3.60
Minimum Wind Speed (m/s)	0.30	0.30	0.30	0.30	0.28	0.23
Maximum Wind Speed (m/s)	26.20	26.20	25.40	24.80	23.10	17.70
Mean Power Density (w/m^2)	260	273	233	198	154	90
Mean Energy Content (kw-hr/m^2/yr)	2,278	2,387	2,046	1,734	1,345	790
Weibull k	2.222	2.226	2.170	2.081	1.964	1.973
Weibull c (m/s)	7.06	7.17	6.74	6.30	5.67	4.56
Record Samples (1)	54,246	54,246	54,246	54,246	54,246	54,246

Note (1): A total of 54,246 data records were collected for the 50m, 40m, 30m, 20m and 10m anemometers at HCC-1 and are given in the table above, representing 100% of data for time period. Minor icing caused anemometers and wind vanes to lose data during the recording period. Data for these time periods was replaced with a synthesizing algorithm.

Frequency by Direction 50mA Data



Wind Power Density by Direction (50mA Data)



Comparison of Power Curves and Energy Capture Projections

The turbines selected for review were confined to units having 1.1MW to 1.65 MW power ratings on their nameplate. Not all units in this nameplate category were evaluated, some units were screened out due to availability issues and others because of limited operating history of the underlying technologies utilized in the manufacture of the wind turbine product line. The power curves for the selected units were used to calculate gross energy capture against collected wind data from HCC-1. These WTGS units are listed:

Manufacturer	Model/Rotor	Nameplate Rating	Hub-Height
AAER/ Fuhrländer	A-1500 77	1500 kW (1.5 MW)	80 m
AAER	A-1650 77	1500 kW (1.5 MW)	80 m
General Electric	1.5sle	1500 kW (1.5 MW)	80 m
Nordex	N60	1300 kW (1.3 MW)	85 m
Suzlon	S66	1250 kW (1.25 MW)	74 m
Vestas	V82	1650 kW (1.65 MW)	80 m

Gross energy capture was estimated for each of the units given above at an average hub-height velocity of approximately 6.70 m/s. Time increment calculations of output power, with wind shear profile recalculated for each time step, were made against the HCC-1 dataset so that reasonable comparison could be rendered. The following table holds the results for these computations.

Manufacturer	Model	Power Rating (kW)	Time at Rated Power (%)	Average Gross Power Output (kW)	Average Gross Energy Output (kW-h/yr)	Average Gross Capacity Factor (%)
AAER/Fuhrländer	A-1500 77	1500	6.10	472	4,134,516	31.5
AAER	A-1650 77	1650	6.10	516	4,535,984	31.2
General Electric	1.5sle	1500	3.83	431	3,774,248	28.7
Nordex	N60	1300	1.02	303	2,650,543	23.3
Suzlon	S66	1250	2.34	348	3,047,545	27.8
Vestas	V82	1650	3.79	513	4,495,955	31.1

Note: This table does not include energy loss that is inherent with system operation; factors contributing to operating losses e.g., blade icing, blade soiling, preventative and curative maintenance, copper loss, and structure wake from buildings and other man-made or natural features contributing to wind flow diversion (de-grading) or convergence (additive).

Attachment 2- Project Permits and Approvals

Agency	Permit	Regulatory Citation	Regulated Activity	Required Project Phase	Expected Review Time
FEDERAL					
USFWS	Endangered Species Act Compliance	50 CFR 17	Turbine sites - Confirmation of no impacts to threatened and endangered species.	Development	3 months
FAA	Notice of Proposed Construction or Alteration	14 CFR 77	Towers - Construction of an object which has the potential to affect navigable airspace (height in excess of 200' or within 20,000' of an airport).	Development	3 months
STATE					
Water Division of the Illinois Department of Natural resources	NPDES General Permit (Storm Water) for Construction Activities		Discharge of storm waters from construction impacting 5 acres or more.	Construction	1 month
Illinois Department of Natural resources	Natural Heritage Inventory Review		Review of all endangered or sensitive species of concern in the project area	Development	2 months
State Historical Preservation Office	Archeological and Historical Review		Activities that could potentially affect archeological or historical resources.	Both	3 - 4 months
LOCAL					
McLean County	Special Use Permit		Special Use Permit for allowed uses in McLean County	Development	3 months
Building Department	Building Permits McLean County		Construction of facility.	Construction	2 month
Building Department	Certificate of Occupancy		Facility Operation	Operation	1 month
Fire Marshal	Fire Safety Approval			Construction	2 months

APPENDIX C
ARRA Renewable Energy Production Program
Proposed Project Costs

Summary:

	Total Costs	Applicant Investment	Contributions From Other Public Sources	State Funding Requested
A. Purchase of Services:	$1,193,000	$1,193,000		$0
B. Equipment/Materials:	$2,753,000	$2,753,000		$500,000
Total:	$3,946,000	$3,446,000		$500,000
Percent of Total:	100%	87%		13%

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 construction	$933,000	
2. Engineering	$95,000	
3. Project management and legal	$65,000	
4.		
5.		
6. Contingency	$100,000	
Subtotal	$1,193,000	$0

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

	Total Costs	State Funding Requested
1. Turbines, blades, and tower	$2,500,000	$500,000
2. Pad mount transformer	$50,000	
3. Underground cable	$9,000	
4. Rock for access road and crane pad	$24,000	
5. Foundation steel and concrete	$70,000	
6. Contingency	$100,000	
Subtotal	$2,753,000	$500,000

APPENDIX C: (cont.)

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

	Total Investment
1.	
2.	
3.	
Subtotal	
Project Total	
State Funds Requested	

Attach additional budget pages if necessary.

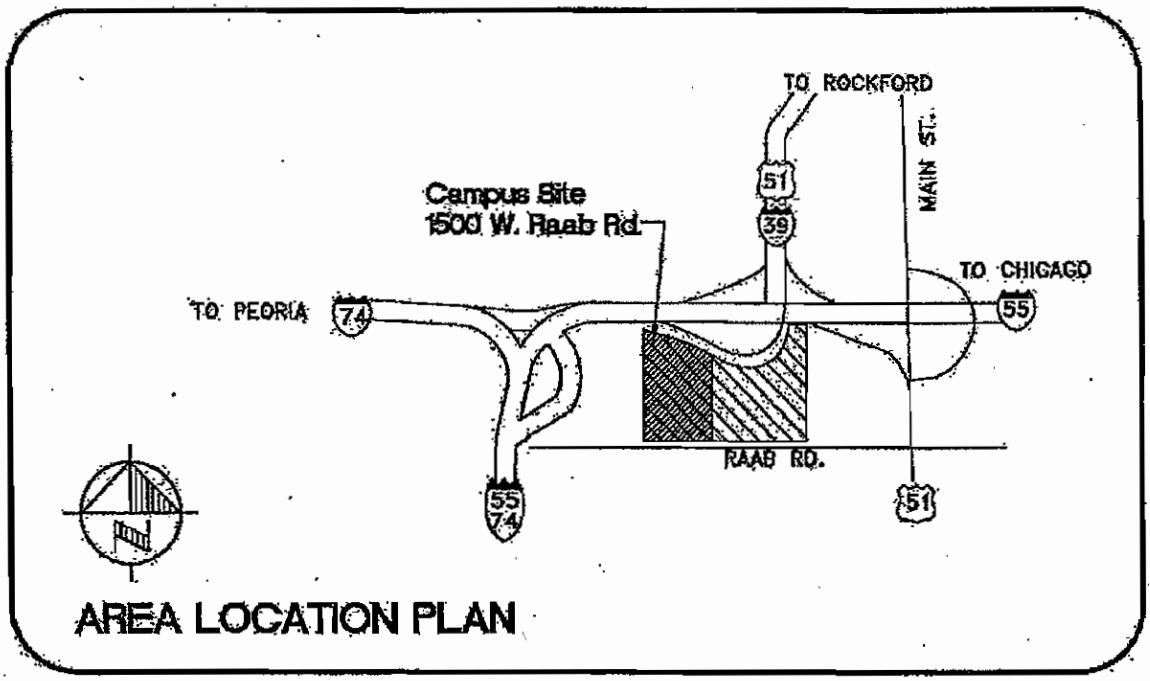
Financial Partnerships and Other Investment Sources, Letter or Guidelines:

Provide letters from each financial partner or funding entity indicating the amount of their support and the project commencement date expected for their partnership.

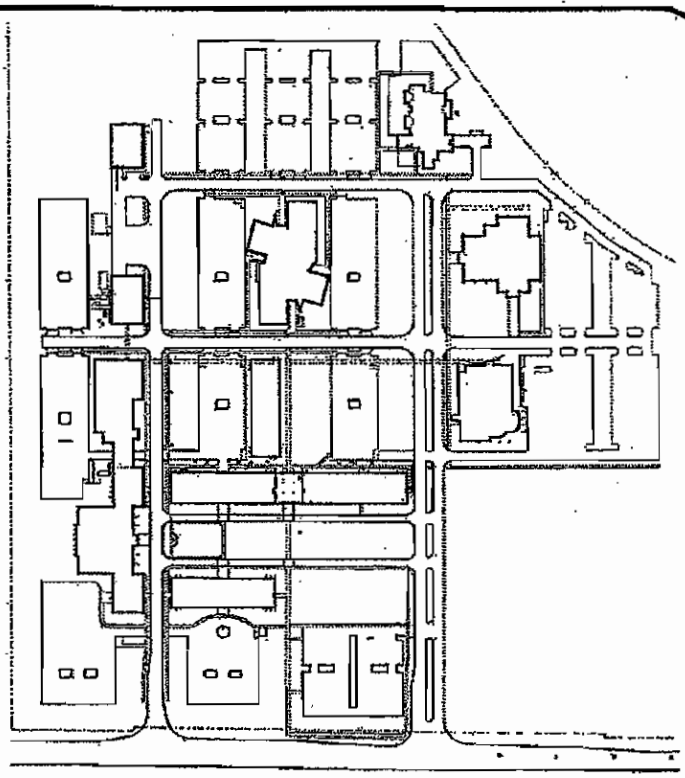
In the event of funding by private foundations or public sources, if such a letter is not yet available, indicate the anticipated source (USDA program name, etc.) and supporting documentation or guidelines for the anticipated source.

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. Businesses should provide annual financial statements for the last three years, or if in business less than three years, provide all available annual financial statements.



AREA LOCATION PLAN



CAMPUS PLAN

Attachment 3.

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

Aeronautical Study No.
2009-WTE-11499-OE

Issued Date: 11/16/2009

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 Heartland
Location:	Normal, IL
Latitude:	40-32-14.39N NAD 83
Longitude:	89-00-54.77W
Heights:	397 feet above ground level (AGL) 1242 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).

X 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 11/16/2011 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.

APPENDIX C: AGENCY COORDINATION

Attachment C-4: NTIA Notification

Date: **6/25/2010**

Type of Notification: **NEW**

Project: **Heartland Community College Wind Energy Project**

County: **McLean**

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):	60-80
Turbine Blade Diameter (meters):	50-65
Maximum Blade Tip Height AGL (meters):	85-112

(X) :Turbine Locations:

GPS: 40.537781, -89.015576 (Google Earth)

Street Address: 1500 Raab Road, Normal, IL 61761

Turbines	Latitude	Longitude
Turbine #1	40.537781	-89.015576
	40-32-I4.39N	89-00-54.77W

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

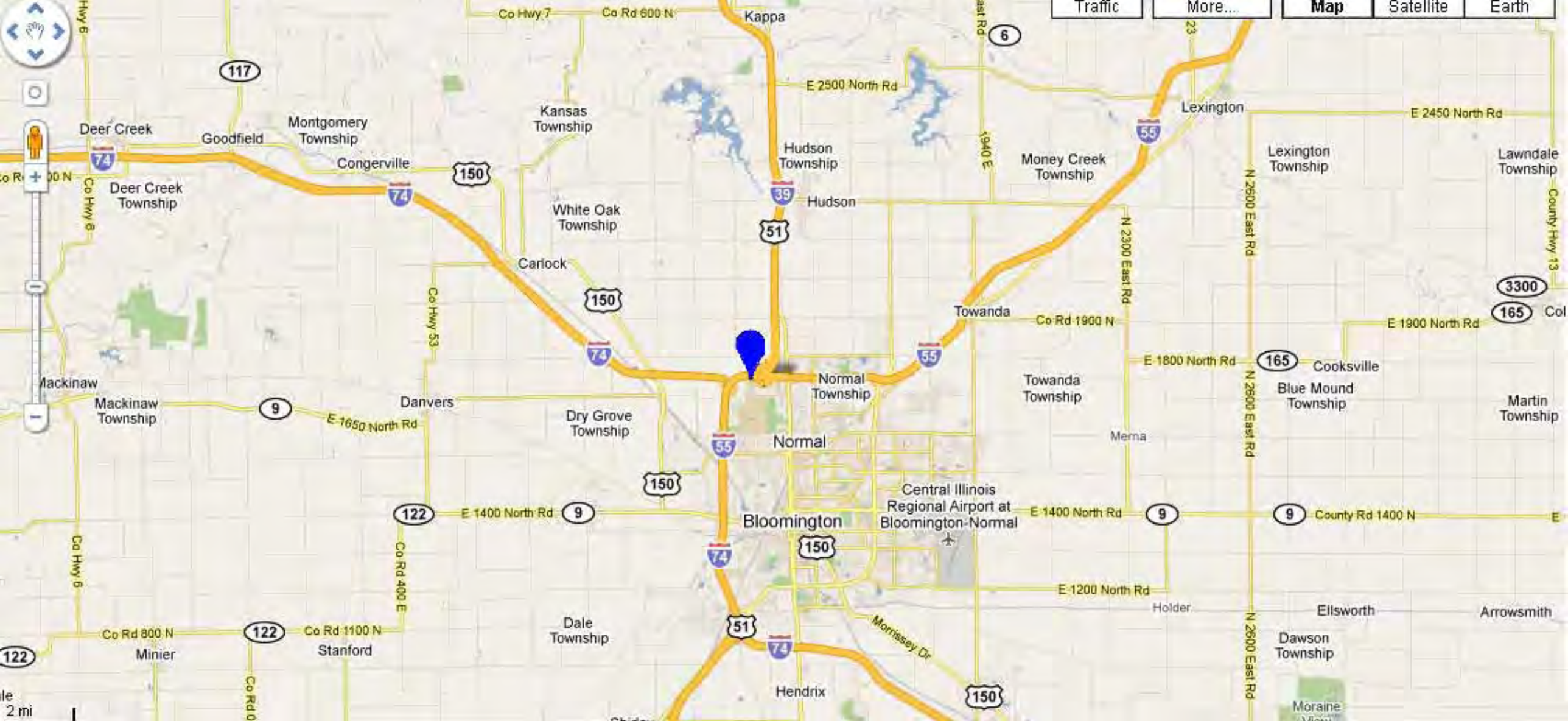
Email: edavison@ntia.doc.gov
Work Phone: (202) 482-5526
National Telecommunications & Information Administration (NTIA)
Domestic Spectrum Policies & IRAC Support Division (DSID)

&

Joyce C. Henry

Email: jhenry@ntia.doc.gov
Work Phone: (202) 482-1850/51
National Telecommunications & Information Administration (NTIA)
Office of Spectrum Management/HQ


51
163
164
165A
55
Vermilion Way
Mackinaw Ct
Kickapoo Ct
W Raab Rd
Raab Rd
N Parkside Rd
C St
B St
A St
7th St
6th St
5th St
4th St
3rd St
2nd St
1st St
500 yds
EnviroMapper
© 2010 Microsoft Corporation © 2010 NAVTEQ © AND
Image courtesy of USGS


Traffic
More...
Map
Satellite
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Co Hwy 7
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Kappa
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E 2450 North Rd
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Montgomery Township
Kansas Township
Hudson Township
Money Creek Township
Lexington Township
Lawndale Township
Deer Creek Township
Congerville
Hudson
White Oak Township
Carlock
Towanda
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N 2300 East Rd
N 2600 East Rd
County Hwy 13
Mackinaw
Mackinaw Township
Danvers
E 1650 North Rd
Dry Grove Township
Normal Township
Normal
Towanda Township
E 1800 North Rd
Cooksville
Blue Mound Township
Martin Township
Mema
Central Illinois Regional Airport at Bloomington-Normal
Bloomington
E 1400 North Rd
County Rd 1400 N
E 1200 North Rd
Holder
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Dawson Township
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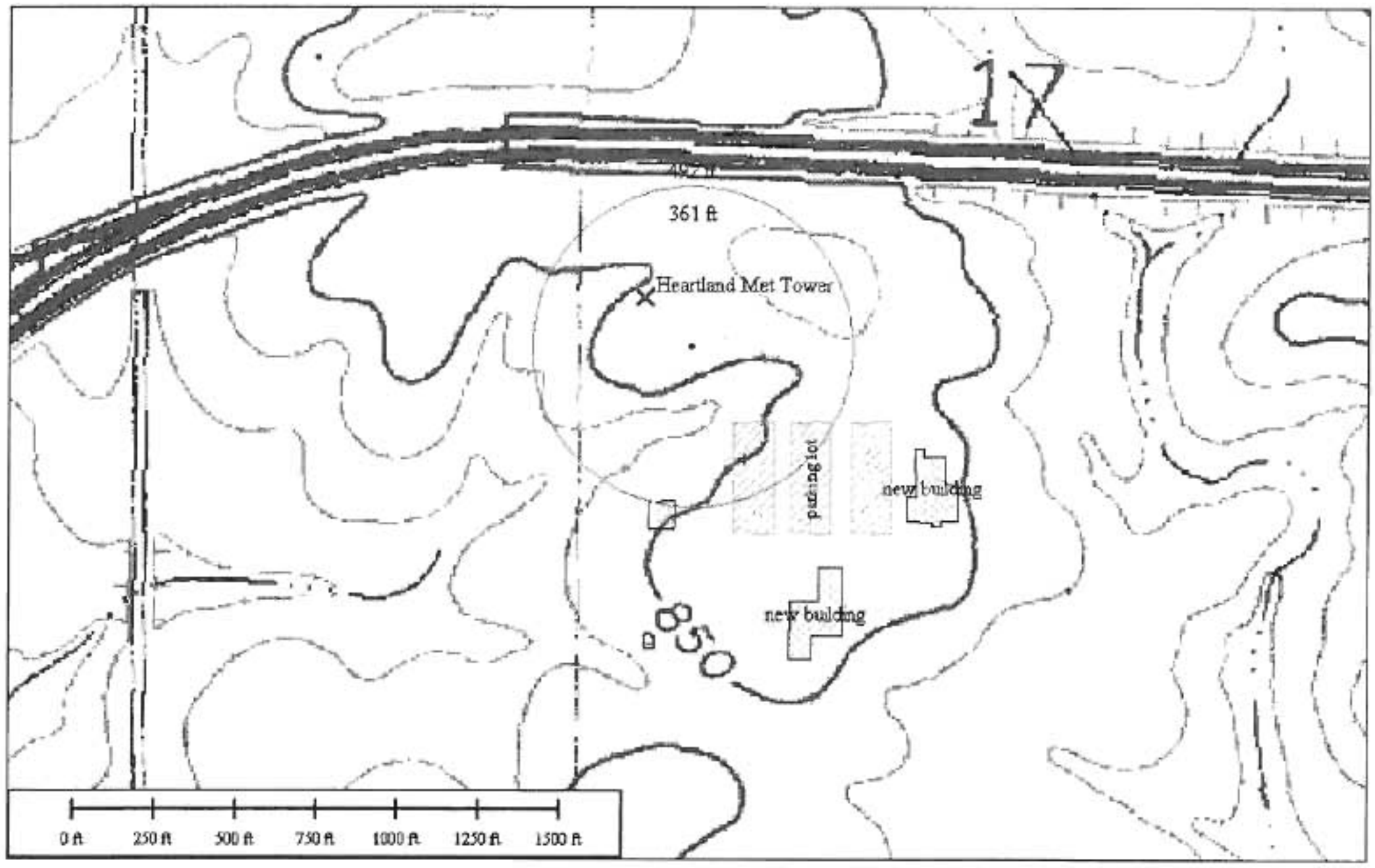


Figure 1 - Project Area- Topographical map

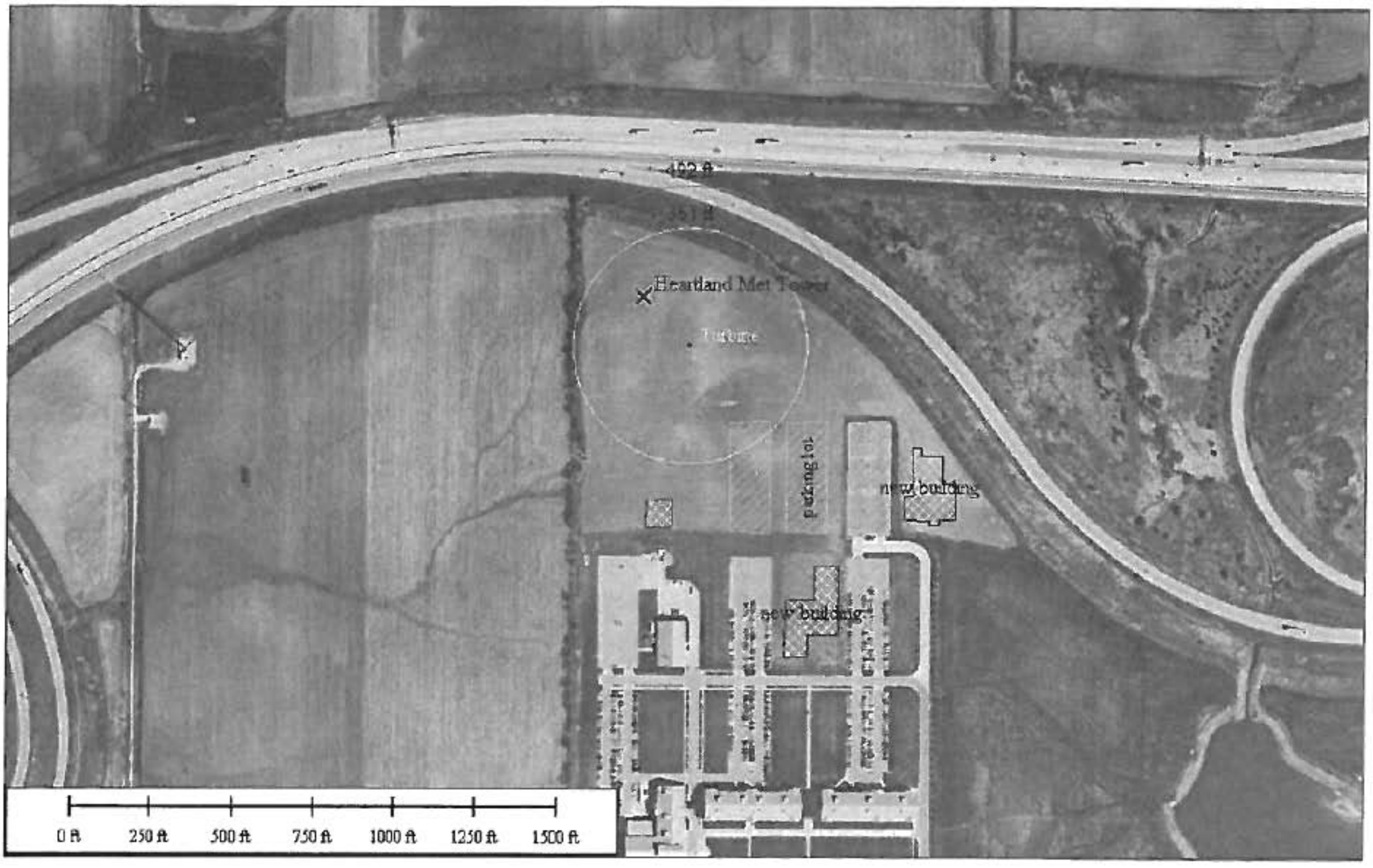


Figure 2 - Project Map- Aerial photo (Yellow ring - 1.1X, green ring – 1.5X)

APPENDIX C: AGENCY COORDINATION

Attachment C-5: USFWS Consultation

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
Heartland Community College's Wind Energy Project, McLean County, IL

Mr. Nelson,

The U.S. Department of Energy (DOE) is requesting concurrence from the U.S. Fish and Wildlife Service (FWS) that the proposed Heartland Community College's Wind Energy Project, McLean County, Illinois is *not likely to adversely affect* the endangered Indiana bat (*Myotis sodalis*) and will have *no effect* on the Eastern prairie fringed orchid (*Platanthaera 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 "Recovery Act" funded wind power projects.

DOE has reviewed the FWS Environmental Conservation Online System to determine that there is no known critical habitat present at the project site. DOE has also obtained the list of threatened, endangered, candidate species for McLean County from the FWS Midwest Region 3 Section 7(a)(2) Technical Assistance Website. From this list DOE has determined the following species have potential to occur in McLean County: the Indiana bat, federally-listed threatened, and the Eastern prairie fringed orchid, federally-listed Threatened. As further described below, the proposed project site is an actively landscaped grass lawn on a college campus, and thus is not suitable habitat for the Eastern prairie fringed orchid. DOE therefore concludes that this project would have no effect on the species.

The project consists of a proposed single 1.5 megawatt (MW) wind turbine along with an associated gravel access road and electrical transmission equipment. The turbine would be installed on the northern end of Heartland Community College, just south of Interstate 55 in Normal, IL (GPS: *Lat.* 40.537781, *Long.* -89.015576). The elevation of the turbine site is 850 feet. The specific model of wind turbine to be installed has not been selected; however Heartland Community College has submitted their preferred total turbine height of 397 feet above ground level to the Federal Aviation Administration for their review.

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 McLean County, Illinois, and the nearest known hibernaculum and designated critical habitat is Black Ball Mines in LaSalle County, Illinois (Priority 2 hibernaculum), approximately 56 miles north of the proposed project area (Pecumsaugan Creek - Blackball Mines Nature Preserve). The proposed project site does not include suitable wintering habitat (hibernacula), and there is no known highly suitable foraging habitat for this species 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, approximately 57 miles to the southeast of the proposed project location.

The Illinois Department of Natural Resources (DNR) was consulted regarding this project and their Ecological Compliance Assessment Tool (EcoCAT) was used to evaluate the proposed site. The EcoCAT system was used as part of the Department's *Consultation for Endangered Species and Natural Area Protection* (Part 1075). The EcoCAT system includes a proximity review for threatened or endangered species occurrences within the Project's vicinity. The Illinois DNR issued a letter to the project proponent indicating that, "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 III. Adm. Code Part 1075 is terminated."

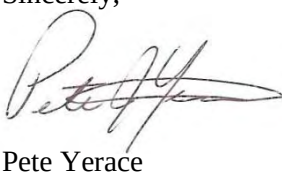
The proposed project site does not include suitable wintering (hibernacula), summer (maternal roosting habitat), or foraging habitat for this species and is unlikely to be within a major migratory pathway. Based on the lack of known occurrences of this species or suitable habitats (hibernacula or summer roosting habitat) at or near the proposed project site, the likelihood that this project will affect individuals of this species or suitable habitats is discountable. The risk to migrating individuals is more difficult to characterize because little is known of 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 due to discountable effects.

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 Heartland Community College's Wind Energy project in McLean County is not likely to adversely affect the Indiana bat. 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 under the National Environmental Policy Act (NEPA 40 CFR 1500-1508) for this project, and will describe the potential impacts to biological resources, including eagles and other migratory birds in that document; DOE will notify your office of the availability of this document.

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,

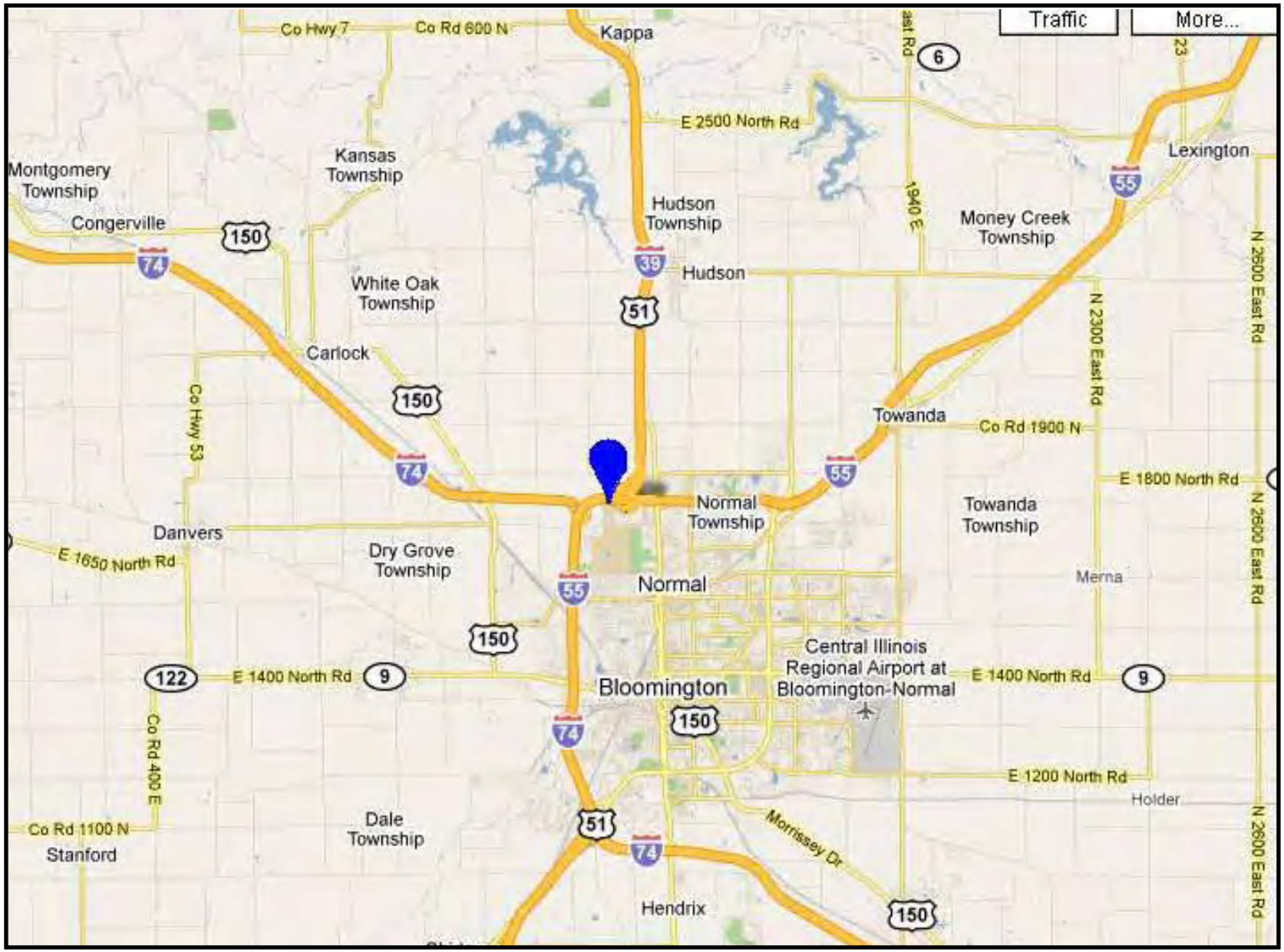


Pete Yerace
NEPA Compliance Officer

Enclosures:
Figures 1, 2
Aerial Maps

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)

Heartland Community College
Wind Turbine Project Location
McLean County, Illinois



Heartland Community College
Wind Turbine Project Location
McLean County, Illinois

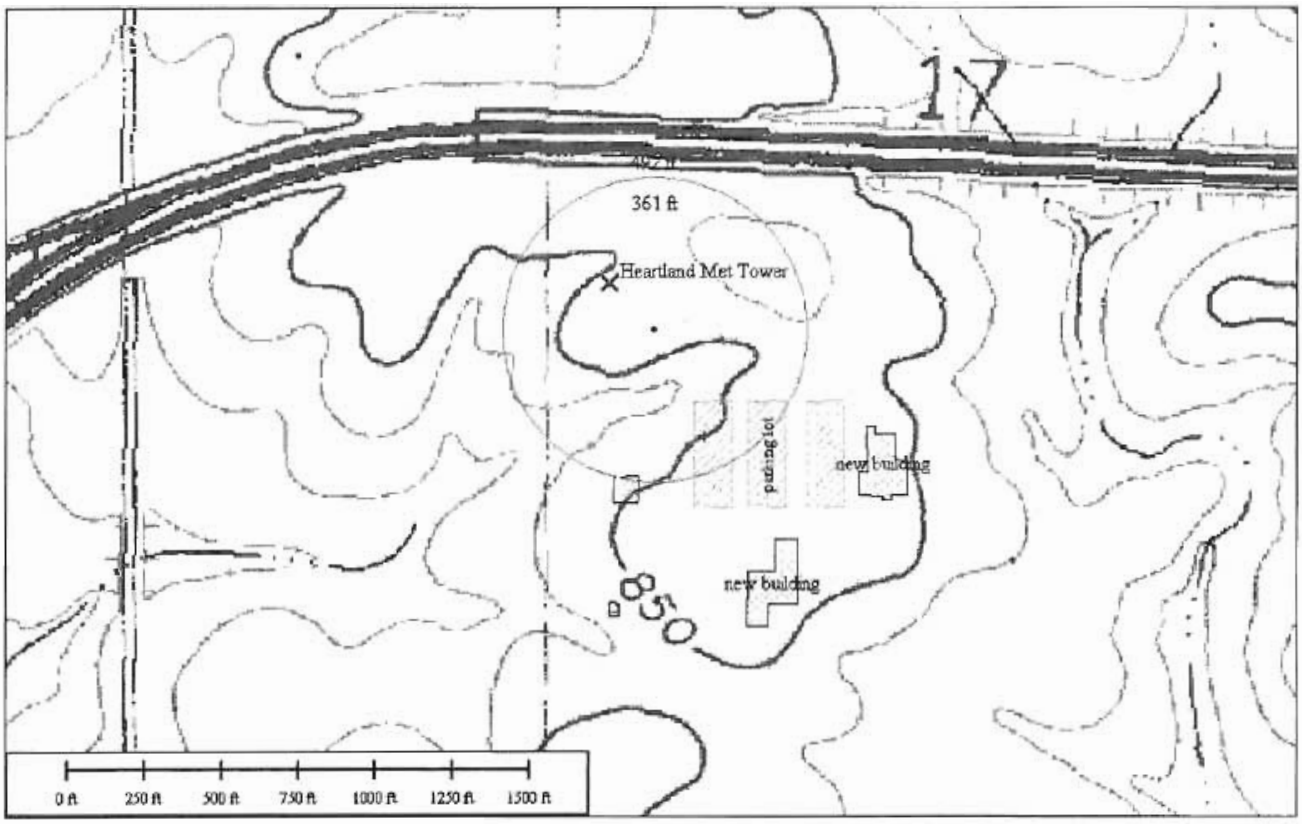


Figure 1 - Project Area- Topographical map

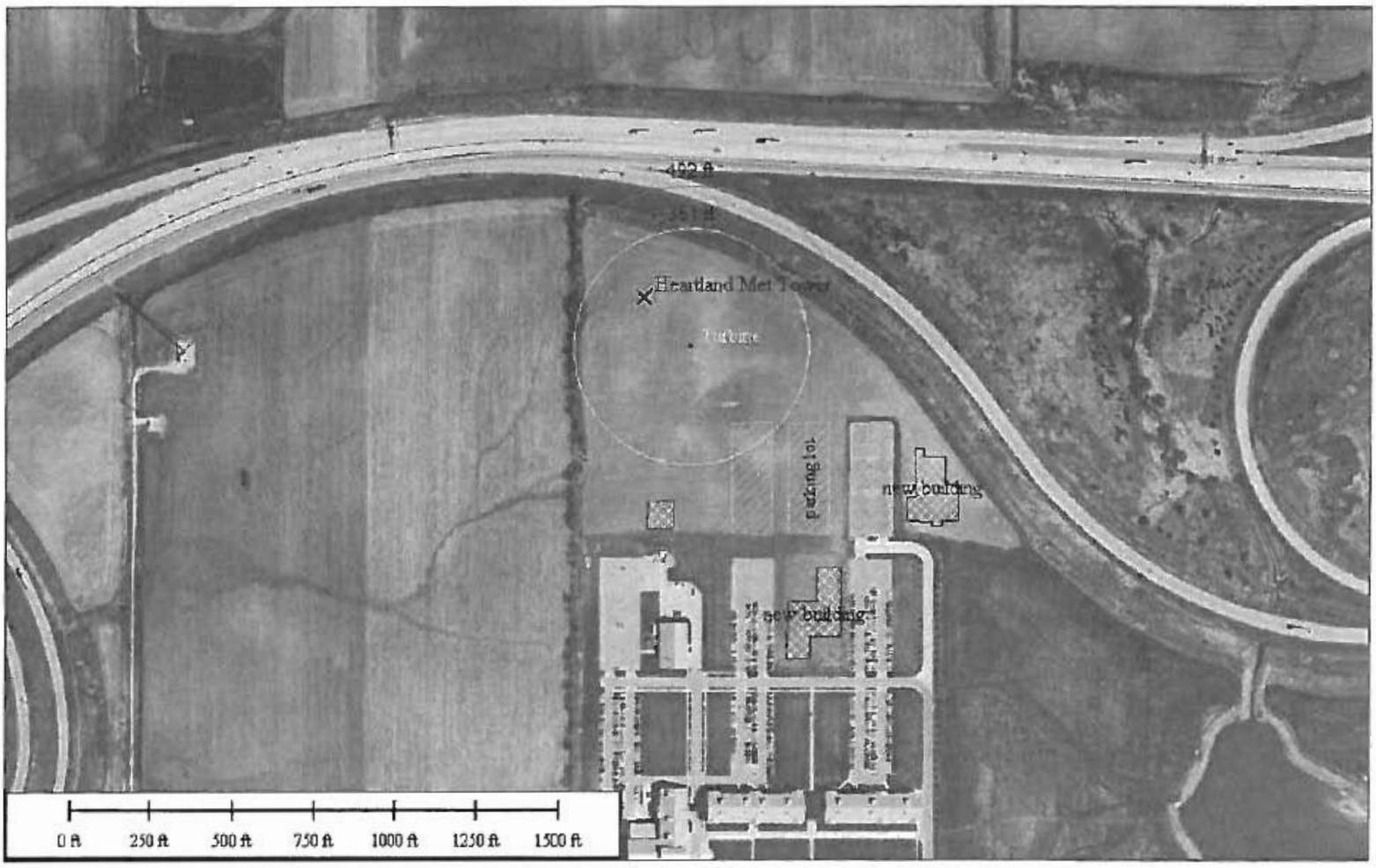


Figure 2 - Project Map- Aerial photo (Yellow ring - 1.1X, green ring – 1.5X)

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 Heartland Community College Wind Energy Project, McLean County, Illinois. Heartland Community College plans to install a single wind turbine at their college campus in Normal, Illinois. The 1.5 megawatt wind turbine will be 397 feet tall. The project will require a gravel access road, and underground electrical transmission equipment. Heartland Community College 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 that there is no suitable habitat in the project area for the federally listed eastern prairie fringed orchid (*Platanthera leucophaea*). The proposed Heartland Community College site is a landscaped grass lawn. 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 summer records for the Indiana bat in McLean County, Illinois, and the nearest known hibernaculum and designated critical habitat area is Blackball Mine in LaSalle County, Illinois (Priority 2 hibernaculum), 56 miles north of the proposed project area. The proposed project site does not include suitable wintering habitat (hibernacula), and there is no known highly suitable foraging habitat for this species 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, approximately 57 miles to the southeast of the proposed project location. The risk to migrating individuals is difficult to characterize because little is known of the migratory patterns of this species. 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.

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,

for Richard C. Nelson
Field Supervisor

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

s:\office users\heidi\concurnlaadoegrantsingleturbineheartlandcc.doc

APPENDIX C: AGENCY COORDINATION

Attachment C-6: NRCS Notification

Farnsworth GROUP

1144 W. Jefferson Street, Suite 300
Shorewood, Illinois 60404
p 815.744.6940 f 815.744.6965

www.f-w.com | www.greennavigation.com

July 28, 2010

United States Department of Agriculture
Normal Service Center
Attention: Mr. Kent Bohnhoff
402 N. Kays Drive
Normal, IL 61761

Subject: Request for Consultation
Heartland Community College Wind Turbine Project

Dear Mr. Bohnhoff:

We request, on the behalf of Heartland Community College, a consultation from your agency for a wind turbine project. Heartland Community College is proposing to install a single 1.5 megawatt wind turbine along with an associated gravel access road and electrical transmission equipment on the northern end of the Heartland Community College's campus, and just south of Interstate 55 in Normal, IL (see enclosed map for approximate location of the proposed turbine). The proposed wind turbine would provide electricity directly to the college, enabling it to reduce the electrical demands of the institution and lower the carbon footprint associated with daily operations. 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 project.

Please respond in writing with your comments or concerns regarding the above referenced project. Thank you for your time and feel free to contact myself at 815.744.6940 with any questions.

Sincerely,

FARSNSWORTH GROUP, INC.

Danielle Wallin

Danielle Wallin
Professional Geologist

Enclosures

cc: Jim Hubbard, Heartland Community College

APPENDIX D: ANALYSIS AND SUPPORTING DOCUMENTATION

APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-1: Heartland Community College Board Meeting Minutes

HEARTLAND COMMUNITY COLLEGE

MINUTES OF THE REGULAR MEETING OF THE HEARTLAND COMMUNITY COLLEGE BOARD OF TRUSTEES

December 12, 2006

Members present: Cindy Brand, Gregg Chadwick, Harry Dunham, Shiney Thomas-Jacob, Roger Tuttle, Jim White, Charlie Mehl

Members absent: Larry Littell

Others present: Jon Astroth, Rob Widmer, Mary Beth Trakinat, Allan Saaf, Kathleen Collins, Sue Gilpin, Janet Hill-Getz, Bob and Sarah Shaw, Gary Short, Michele Steinbacher of The Pantagraph, Laura Mai

Chair Cindy Brand called the Regular Meeting of the Board of Trustees of Heartland Community College to order at 7:00 p.m. at Heartland Community College, CCB 2011/2012, Normal, Illinois.

PUBLIC COMMENT/INTRODUCTION OF GUESTS

There were no public comments.

CONSENT AGENDA

Mr. Jim White moved to approve the consent agenda. Mr. Roger Tuttle seconded. A roll call vote was unanimous. Motion carried.

Items approved on the Consent Agenda were the minutes of the regular meeting of November 14, 2006, ratification of bills paid during the month of November 2006, and the Board Meeting Calendar.

STAFF REPORTS

Financial

Mr. Rob Widmer, VP Business Services, thanked Mr. Roger Tuttle for reviewing the bills prior to the meeting. Mr. Widmer noted that the interest rates of 5% plus are becoming more common and expenditures are on target for this time of year.

1500 W. Raab Rd.
Normal, IL 61761
(309) 268-8000
TDD (309) 268-8030
www.heartland.edu

OTHER REPORTS

Recognition & Correspondence

President Jon Astroth noted that an Ameren inspection of the Pontiac and Lincoln electrical systems revealed no problems - a first in the six-year career of the Ameren inspector. Mr. Jim Hubbard, Division Director of Facilities, attributes this to Mr. Dana Berry, Electrician.

Dr. Allan Saaf, VP Instruction, noted that two faculty members from the Technology Division, Mr. Chris Miller and Ms. Kim Travers, were honored by National Association of Industrial Technology. Dr. Bob Shaw and others have been heavily involved in that organization for some time.

Dr. Saaf invited everyone to attend the Business Essentials graduation on December 20 at 2:00 pm.

Ms. Mary Beth Trakinat, VP Continuing Education, noted that Ms. Christy Post, Director of Adult Education, received an award from the City of Bloomington Township for a four-week program "Skills for Success."

Cabinet/Other

President Astroth distributed a list of possible invitees to the WDC ribbon cutting on August 1, 2007 and asked trustees to bring back any additions.

President Astroth suggested holding the January board retreat and legislative breakfast at HCC.

President Astroth reported that on January 16 at 6:30pm there will be a small reception for the visiting Chinese students. Currently, 19 students have received their visas, and approximately 24 students are expected in all. President Astroth also invited the trustees to a dinner with the Chinese delegation representing the students. Details will follow.

President Astroth thanked the board for participation in recent student life events. Mr. Gregg Chadwick entered the chili cook-off, trustees also attended the press conference on sports and the employee holiday reception. Articles in The Pantagraph were also appreciated.

Mr. Rob Widmer noted that work on the Workforce Development Center continues and May 1, 2007 is still targeted for substantial completion with people moving in during July. The lease at Towanda Plaza ends on July 31, 2007.

Mr. Widmer gave an update on the campus master planning discussions with BLDD noting there is always opportunity for change with time. Referring to the architect's drawing of the campus, he highlighted the following: a student center added to the north end of the Student Commons Building; a classroom facility between the WDC and the ICB and physically connected to both; a multi-purpose auditorium east of the Millennium Boulevard, which would increase to two lanes in and two lanes out; a fitness and recreation center north of the auditorium and east of the boulevard; a child care facility wrapping back around the road being built with the WDC, and west of the boulevard. There are currently 1100 parking spaces, this plan adds approximately 500 new spaces by expanding an existing lot and creating parking east of the boulevard. East of the lake are potential athletic fields for softball, baseball, and soccer, concessions, and parking. The plan looks to the future for facilities and services to be offered by a mature campus. The plan to build as a green campus could include wind power in the future.

TRUSTEE REPORTS

ICCTA

Ms. Cindy Brand noted that the legislative seminar is scheduled for February in Washington, DC.

Student Trustee

Mr. Charlie Mehl distributed his report and noted highlights.

Other

No other reports.

NON-PERSONNEL ACTION ITEMS

Board Policy Revision: Smoke Free Environment – Second Reading

Mr. Roger Tuttle moved to approve the changes to Board Policy 3.4 Smoke Free Environment as presented. Mr. Harry Dunham seconded. Motion carried with a voice vote.

Tax Levy Resolution

Mr. Harry Dunham moved to rescind the action of October 17, 2006 calling for a public hearing and publication notice regarding the 2006 tax levy, and to adopt the "Resolution Regarding Amounts Necessary To Be Levied For The Year 2006" and Certificate of Tax Levy as presented. Mr. Jim White seconded. A roll call vote was unanimous. Motion approved.

CLOSED SESSION

Mr. Jim White moved to go into closed session at 7:42 pm to consider the appointment, employment, or compensation of specific employees, sale and lease of real property, and closed session minutes. Mr. Roger Tuttle seconded. Motion carried with a voice vote.

Chair Cindy Brand reconvened the regular meeting at 7:53 p.m.

PERSONNEL ITEMS

Personnel Actions

Mr. Jim White moved to approve the monthly personnel actions included in monthly personnel actions. Mr. Gregg Chadwick seconded. A roll call vote was unanimous. Motion approved.

PUBLIC COMMENT

There was no public comment.

ADJOURNMENT

Ms. Shiney Thomas-Jacob moved to adjourn. Mr. Harry Dunham seconded. Motion carried with a voice vote.

The meeting was adjourned at 7:54 pm.

Cindy Brand, Chair

Larry Littell, Secretary

*Note: The student trustee vote is advisory only.

HEARTLAND
COMMUNITY COLLEGE

MINUTES OF THE REGULAR MEETING OF THE HEARTLAND COMMUNITY COLLEGE BOARD OF TRUSTEES
February 20, 2007

Members present: Cindy Brand, Gregg Chadwick, Harry Dunham, Larry Littell, Shiney Thomas-Jacob, Roger Tuttle, Jim White, Charlie Mehl

Members absent: None

Others present: Jon Astroth, Rob Widmer, Mary Beth Trakinat, Helen McKay-Katz, Allan Saaf, Kathleen Collins, Sue Gilpin, Steve Herald, Janet Hill-Getz, Joe McCauley, Dana Rosenberg, Bob Shaw, Gary Short, Pamela Sweetwood, Nicholas Davidson, Mallory Lootens, Cameron McLees, April Phillips, Steve Graham, Ann McCowen, Holly Richrath of The Peoria Journal Star, Michelle Steinbacher of The Pantagraph, Laura Mai

Dr. Catherine Miller, Associate Dean of Health and Human Services, presented a demonstration of the nursing facilities prior to the board meeting.

Chair Cindy Brand called the Regular Meeting of the Board of Trustees of Heartland Community College to order at 7:00 p.m. at Heartland CCB 2011/2012, Normal, Illinois.

Chair Cindy Brand appointed Ms. Shiney Thomas-Jacob as acting secretary to sign documents at this meeting. (Mr. Littell arrived at 7:20 pm.)

PUBLIC COMMENT/INTRODUCTION OF GUESTS

Dr. Kathleen Collins, Dean of Student Services and Academic Support, introduced Ms. April Phillips and Mr. Nicholas Davidson, two Heartland students.

CONSENT AGENDA

Mr. Roger Tuttle moved to approve the consent agenda. Mr. Gregg Chadwick seconded. A roll call vote was unanimous. Motion carried.

Items approved on the consent agenda were the minutes of the regular meeting of January 16, 2007, the minutes of the legislative meeting and board retreat of January 26, 2007, ratification of bills paid during the month of January 2007, and the fall 2007 credit class schedule printing bid.

STAFF REPORTS

1500 W. Raab Rd.
Normal, IL 61761
(309) 268-8000
TDD (309) 268-8030
www.hcc.cc.il.us

Financial

Mr. Rob Widmer, VP Business Services, thanked Mr. Harry Dunham for reviewing the bills. Mr. Widmer reported that the College is in the process of receiving proposals to engage an audit firm, and Mr. Gregg Chadwick agreed to serve as a Board representative on the audit review process. The investment report continues to show rising interest rates, and the revenues and expenses report are on target for this time of year.

ANNUAL REPORTS

Community Scholars

Dr. Helen McKay Katz, VP Institutional Advancement, introduced Ms. Pamela Sweetwood, Director of Special Programs. Ms. Sweetwood noted that Community Scholars is a two-year program that provides scholarships to 15 in-district high school graduates yearly; the students volunteer for five hours a week each semester at non-profit agencies. Mr. Cameron McLees, a first year student from Normal Community HS, reported on Rotaract Club. Ms. Mallory Lootens, a second year student, reported on her volunteer work at various Heyworth programs and the Children's Discovery Museum.

Marketing and Public Information

Dr. Helen McKay Katz introduced Ms. Janet Hill-Getz, Director of Marketing and Public Information. Ms. Hill-Getz noted that Marketing and Public Information has been very active this year promoting Heartland in magazines, the website, and a sign at the Redbird Arena. The written report provides an overview of marketing activities. A copy of the Foundation's Annual Report was distributed.

Credit Enrollment Spring 10th Day

Dr. Allan Saaf introduced Dr. Kathleen Collins, Dean of Student Services and Academic Support. Dr. Collins reported that spring enrollment and headcount are up since last year. Spring credit hours are at an all-time high for the last five years which represents a 5.5% increase since spring 2006. The FTE is 2,696. Traditional age students represent 64% of the student body, and the largest number of students are from within the district.

OTHER REPORTS

Student Satisfaction Inventory

Dr. Allan Saaf, VP Instruction, asked Dr. Dana Rosenberg, Director of Institutional Research and Planning, to report on the Fall 2006 Student Satisfaction Inventory that she and Mr. Paul Folger, Director of Instructional Development Center and Academic Support Center, prepared. Dr. Rosenberg noted that the advantage of using a nationally normed survey is the ability to compare Heartland's results to the results of students at other community colleges across the country. The faculty administered over 800 surveys in classes and Dr. Rosenberg and Mr. Folger analyzed the results. According to the inventory, overall satisfaction with Heartland exceeds the average with comparison schools. Dr. Rosenberg described future analysis planned for the inventory results.

Recognition & Correspondence

President Jon Astroth noted the following: Heartland has signed on to the Illinois Sustainable University Compact.

Mr. Rick Allbee, Academic Advisor, was published in the *Journal for the Study of the Old Testament*.

Ms. Kim Travers, Assistant Professor of Industrial Technology, was elected chair of the National Association of Industrial Technology's Executive Board.

Cabinet/Other

Dr. Allan Saaf distributed a booklet from the SIT Conference and showed photos of the children's designs, including a hovercraft. Approximately 300 children participated.

Dr. Saaf noted that Heartland will sponsor a College Information Night on February 22, and distributed marketing materials for the event.

Dr. Saaf noted that Ed Carroll, Professor of History, was appointed as vice-chair of a committee for the Abraham Lincoln Illinois Bicentennial Commission.

Mr. Rob Wider noted that the College anticipates substantial completion on May 1, 2007 for the Workforce Development Center. Between May 1 and July 9, furnishings, technology, and equipment will be placed in the building and staff will move beginning the week of July 9.

Mr. Widmer invited interested trustees to attend a web conference on deploying a wind turbine on a college campus on May 1 and 3 from noon to 1:30 pm.

Mr. Widmer discussed electric deregulation and noted that, based on past utilization, the College will save over $100,000 this year by taking advantage of real-time pricing and alternative energy suppliers.

President Jon Astroth distributed a list of upcoming student activities and an article on community colleges going green. He noted that the March 20 Board meeting is in Lincoln, the van will leave at 5 pm, and dinner will be at Guzzardo's prior to the meeting.

President Astroth requested Board feedback on the draft mission statement.

President Astroth presented a PowerPoint currently in use to try to education community members about some of the forces driving the Phase II Campus Project. Dr. Kathleen Collins introduced Ms. April Phillips, President of the Student Government, and Mr. Nicholas Davidson, President of Baccus; both are members of Phi Theta Kappa. Ms. Phillips (after speaking with students on campus, student group liaisons, and the student trustee) reported that the student body encourages the growth and development of the campus; the expansion of the student life activities has had a remarkable impact on the morale and enthusiasm of the student body; students are excited to see the Hawks and the implementation of the athletic programs. She added that student concerns include parking, student to teacher ratio, and maintaining a clean, secure campus. Mr. Davidson added his appreciation to the Board for their efforts in these matters.

Chair Cindy Brand reported on the local Chinese New Year celebrations.

TRUSTEE REPORTS

ICCTA

Mr. Gregg Chadwick reported on the ACCT Public Policy Committee and distributed the legislative agenda which was ratified last fall and reviewed by the ACCT this year.

Ms. Cindy Brand noted March 10 is the next ICCTA meeting and April 25 is Lobby Day.

Student Trustee

Mr. Charlie Mehl distributed his report and noted highlights including: efforts being made for a ride share and clubs working for a hawk presentation during Springfest.

Other

No other reports.

CLOSED SESSION

Mr. Gregg Chadwick moved to go into closed session at 8:10 pm to consider the appointment, employment, or compensation of specific employees; pending litigation; purchase, sale, or lease of real property, and review of closed session minutes. Mr. Larry Littell seconded. Motion carried with a voice vote.

Chair Cindy Brand reconvened the regular meeting at 9:13 p.m.

NON-PERSONNEL ACTION ITEMS

Phase II Master Plan

Mr. Roger Tuttle moved to adopt the Phase II Master Plan (January 2007) as the current facilities master plan for Heartland Community College. Mr. Larry Littell seconded. Motion carried with a voice vote.

Phase II Campus Locally Funded Project

Mr. Harry Dunham moved to approve as a locally funded capital project, a Phase II Campus Project consistent with scope, budget and schedule presented in the Phase II Master Plan (January 2007), and authorize submission of a Locally Funded Capital Project Application for the Phase II Campus Project to the Illinois Community College Board. Mr. Jim White seconded. Motion carried unanimously with a roll call vote.

Phase II Campus Project Architect/Engineer Professional Services

Mr. Jim White moved to retain the firm of BLDD Architects, Inc., based on the existing, satisfactory relationship established between BLDD and the College, to provide in conjunction with qualified consultants, architectural and engineering services for the Heartland Community College Phase II Campus Project. Mr. Larry Littell seconded. Motion carried unanimously with a roll call vote.

Phase II Campus Project Fiscal Agent

Mr. Gregg Chadwick moved to retain First Midstate Incorporated to act as financial consultant and fiscal agent with respect to the proposed Heartland Community College Phase II Campus Project bond issue. Ms. Shiney Thomas-Jacob seconded. Motion carried unanimously with a roll call vote.

~~Phase II Campus Project Bond Counsel~~

Mr. Larry Littell moved to retain the law firm of Chapman and Cutler of Chicago, Illinois as Bond Counsel in regard to the proposed Heartland Community College Phase II Campus Project bond issue and hereby authorize the firm to prepare the necessary legal proceedings for the proposed bond issue and advise Heartland of the legal necessities. Mr. Harry Dunham seconded. Motion carried unanimously with a roll call vote.

PERSONNEL ITEMS

Personnel Actions

Mr. Roger Tuttle moved to approve the monthly personnel actions included in monthly personnel actions. Mr. Larry Littell seconded. A roll call vote was unanimous. Motion approved.

Tenure Recommendations

Mr. Larry Littell moved to grant tenure to the following faculty, effective with the 2007-2008 academic year: Francine Armenth-Brothers (Health), Verona Barr (Biology), Jane Chapman (Biology), Bill Marrs (Business and Economics), Kim McHale (Mathematics), Cindy Pulley (Mathematics), Karen Shaw (Education). Ms. Shiney Thomas-Jacob seconded. Motion carried unanimously with a roll call vote.

PUBLIC COMMENT

There was no public comment.

ADJOURNMENT

Mr. Roger Tuttle moved to adjourn. Mr. Larry Littell seconded. Motion carried with a voice vote.

The meeting was adjourned at 9:20 pm.

Cindy Brand, Chair

Larry Littell, Secretary

*Note: The student trustee vote is advisory only.

APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-2: Wind Resource Analysis and Wind Turbine Recommendations

HEARTLAND COMMUNITY COLLEGE

Wind Resource Analysis
and
Wind Turbine Recommendations

October 30, 2009

Mr. Jim Hubbard, Director Operations

CONFIDENTIAL

Alternate Energy Solutions, Inc.
Gratiot Office Plaza – 2nd Floor
23801 Gratiot Ave.
Eastpointe, Michigan 48021
Phone: (586) 498-8840

IMPORTANT NOTICE

This report was written by Alternate Energy Solutions, Inc. for, and on behalf of, the management of Heartland Community College, Normal, Illinois ("Heartland"). The report has as its primary objective the summation of wind monitoring during a twelve month period over calendar years of 2008 and 2009. The secondary objective of the document is to provide a review of probable wind turbine generator energy capture with an initial recommendation to equipment.

This report provides an assessment of the wind regime for the locations identified herein, along with energy capture estimates for select wind turbine generating units and estimates for energy capture, using historical wind data from an optimistic, realistic and pessimistic prospective. This document and the recommendations contained herein have been compiled from data sources believed to be accurate. The computations and recommendations contained in this document are theoretical in nature. Our work included review of the recorded data, local historical data, technical documentation, discussions with manufacturers, and information derived from professional sources.

The report is based on actual metered wind velocity data collected from a single NRG 50m XHD meteorological tower. Short-term data was collected from the National Climatic Data Center (NCDC) for the WBAN FAA/AWSS Station No. 54831 located at Central Illinois Regional Airport – Bloomington Normal (KBMI) and intermediate-term data from WBAN FAA/AWSS Station No. 93822 located at Springfield Capitol Airport (KSPI).

The findings expressed herein are principally theoretical; guarantees of future performance cannot be given. The use of this report by Heartland involves significant project and financial risk. However, this report provides Heartland with a learned opinion and recommendation which must be carefully discussed by the College's Administration and Board of Trustees prior to making a final determination on project suitability for the school and the community.

This document also contains privileged manufacturer's data that is under a conditional non-disclosure agreement. AESI respectfully requests that this report and material therein, be treated confidentially and limited to review by school administrators, directors, officers, business managers, legal representatives and engineers.

TABLE OF CONTENTS

APPENDIX

1. Executive Summary

Alternate Energy Solutions, Inc. ("AESI") was engaged by the administration of Heartland Community College ("Heartland") to purchase, assemble, erect and maintain one 50m XHD meteorological tower manufactured by NRG Systems, Inc.; for monitoring, recording and evaluating collected wind data. Wind data collection activities are for the purpose of investigating the viability and practicality of the local wind regime for possible future integration of a wind turbine generator (WTG) to generate electrical energy and offset a portion of the college's base electric load. Our evaluation finds that the local wind regime is suitable for wind power development, provided, turbines designed for medium wind velocities are used and the initial capital cost (ICC) for the project is carefully controlled through thorough pre-engineering design and prudent project work-scope definition and bidding.

One site was selected on campus for wind meteorological tower monitoring and is identified as HCC-1. Construction of the meteorological tower began during the month of June 2008. Data recording began July 4, 2008 and continues to the present day. One calendar year of data was collected prior to the writing of this report. Data was validated against local meteorological sources believed to be accurate. The average annual 50 m level wind velocity recorded at HCC-1 was 6.30 m/s (14.1 mph) yielding an approximated wind power density of 267 w/m^2 for the time period studied.

Wind power density at HCC-1 would be traditionally categorized as a Class II wind regime. The reader of this report should be mindful that technological improvements in wind turbine generator design and rotor efficiency give Class II wind regimes improved stature as viable wind resources. As the price of electrical energy tends to increase, low wind regimes become more viable and acceptable resources for wind generating assets and infrastructure. Additional considerations should include the present and future cost of electrical energy, measured wind velocities compared to historical wind velocities, financial impact of federal and state carbon emission regulations, improved operating efficiencies of new wind turbine technologies with higher rotor hub-heights, and stewardship to our environment.

Four years of historical wind data was compiled using NCDC data from Normal, IL and compared against the recorded wind velocities from HCC-1, beginning with February 2005 through August 2009. Because of the limited local dataset, the data from WBAN FAA/AWSS Station No. 54831, located at Central Illinois Regional Airport – Bloomington Normal (KBMI), was used to identify local events such as icing. Due to the limited dataset from KBMI, a 20 year dataset from WBAN FAA/AWSS Station No. 93822, located at Springfield Capitol Airport (KSPI), was acquired for intermediate-term correlation of wind velocities with HCC-1.

Using the data, an initial list of wind turbine generators in the 1.5 MW (1,500 kW) nameplate rated class was compiled. The International Electro-technical Commission Wind Turbine Survival Standard (IEC Standard 61400) was the reference used against compilation process.

For this study, the wind turbines are presumed to be placed on 80 m (262.4 ft.) towers. The Federal Aviation Association (FAA) and local airport authority (having zoning jurisdiction and ordinance interpretation for Central Illinois Regional Airport) may influence the ultimate location for the project and invoke regulation on tower obstruction lighting.

Extrapolations using recorded tower data with the Power Law and Logarithmic Law infer that the average annual wind velocity for the period fell into the range of 6.95 m/s (15.5 mph) to 7.24 m/s (16.2 mph) at 80 m hub-height; based on extrapolation of the data recorded data from the HCC-1 meteorological tower. Correlated intermediate-term data suggests that at 80m projected P_{50} wind velocities could range from 6.36 m/s (14.2 mph) (pessimistic) to 6.79 m/s (15.2 mph) (optimistic). For this executive summary, projected P_{50} wind velocities were applied to wind turbine manufacturers' power curves and yielded gross energy capture estimates ranging from 3,877 MW-h to 4,415 MW-h, for a typical 1.5 MW wind turbine generator. This equates to gross capacity factors ranging from 29.4% to 33.5%. The capacity factors given in this report are derived from gross generation calculations using an AAER A-1500-77 wind turbine. Wind velocities, power curves, hub-height and other factors will affect a wind turbines gross and net energy capture.

It is important to note that the P_{50} velocities fall marginally below of those wind velocities expressed on wind maps commissioned by Illinois Clean Energy and AWS Truewinds. For example, AWS Truewinds estimates the wind velocity to be 7.21 m/s at 80m in the study region. Excluded from the gross capacity factor computations are potential losses that could occur due to blade soiling, icing of rotor, transmission and distribution line loss, and maintenance (both scheduled and unscheduled). Net Operating Losses generally fall in the range of 5% to 13%. Potential losses are dependent on factors outside the scope of this study.

As part of this study, we were directed to place emphasis on availability of wind turbines for a possible commissioning date in the fall of 2010. The matter of initial capital cost (ICC) expenditures for manufactured wind turbines, project infrastructure and construction, and other ancillary costs, were estimated and based on our knowledge of other projects. The ICC estimates were used to determine the unit cost of energy (UCE) for a proposed single turbine facility. Extensive cost estimating tasks were not undertaken in the composition of this document; and, are generally a part of a formal project pro forma.

We estimate the installed cost of a single 1.5 MW wind turbine installation with an 80 m hub-height at $3,206,638.00 or $2,138/kW for prudently designed and bid projects; projects bid as ECP contracts will typically command an additional project risk premium of 8% to 15%. Unit cost of energy is estimated at $0.04536/kW-h to $0.05038/kW-h, using P_{75} wind velocities, with the cost of maintenance included and estimated at $0.005/kW-h. The cost of maintenance will be determined by the manufacturer and Heartland, reflecting the scope of service and coverage to be provided.

2. Meteorological Tower Locations and Equipment

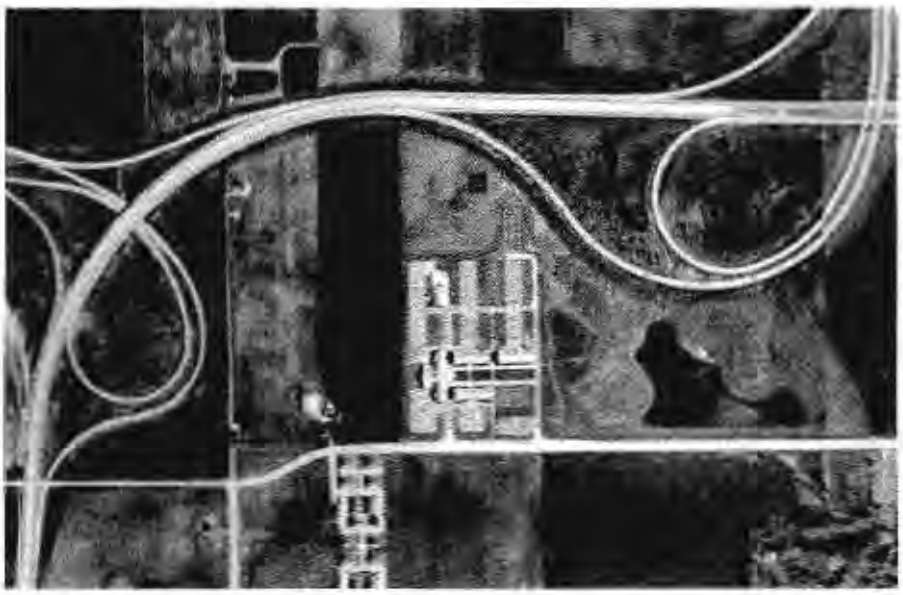
At present, a meteorological tower measures and records the wind velocity at a single site that is being studied by Heartland and AESI for the installation of one wind turbine generator (WTG).

Meteorological Tower Location:

Identifier:	HCC-1
Latitude:	N 40° 32' 17"
Longitude:	W 89° 00' 58"
Elevation:	261 m (856 ft ASL)
Commissioned:	July 4, 2008

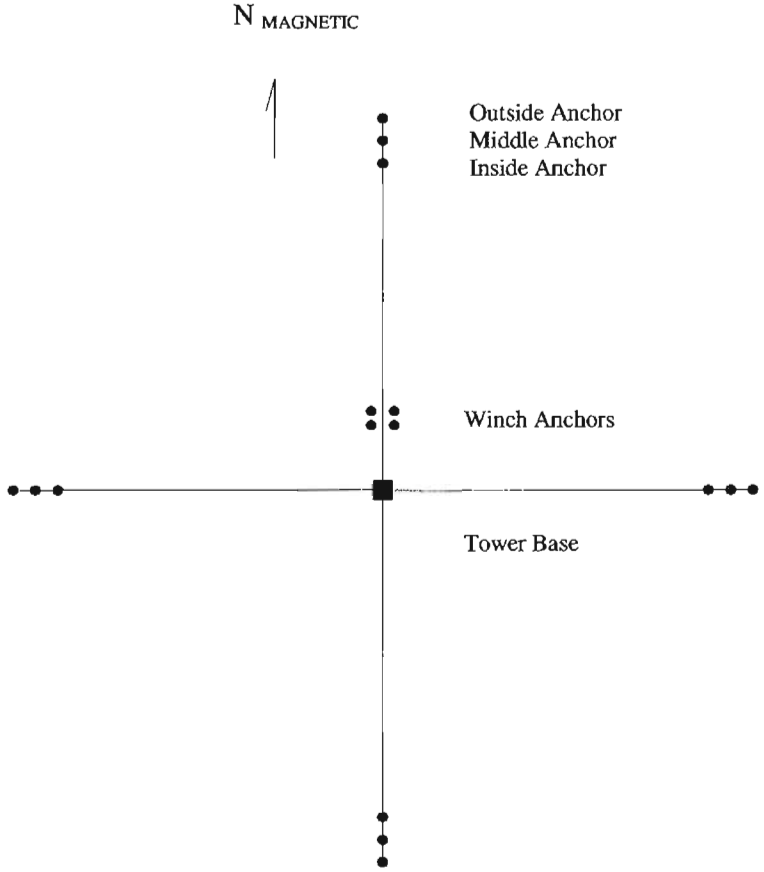
The site is located on the north side of the college's campus and may be described as open field with tall grass, shrubs and small trees; and, furthermore, borders the south of I-55 and east bound Exit No. 164 to I-39. Mr. James Hubbard and Mr. Steven Smith (Farnsworth Group) deemed the location suitable for the installation of the meteorological test tower.

Location of Meteorological Tower HCC-1



The meteorological tower is supported by a total of twenty-four galvanized steel cables, 1/4" diameter, having 7 x 19 filament construction; with 6 cables on each quadrant point, 3 cables per anchor. A total of twelve screw-in anchors provide primary anchoring for the tower. The outside anchors are further supplemented with arrowhead tipping-plate anchors driven to a vertical depth of 4.5 ft. to 5.0 ft.

Approximate Orientation of Tower Base and Anchors at HCC-1



HCC-1 Looking Northwest from Center Campus

(AESI Photo)

Sensors

The meteorological tower is equipped with anemometers, wind vanes, barometric and temperature sensors.

Anemometers are the 1900 NRG #40C (calibrated) devices manufactured by O-Tech and shipped as part of the meteorological tower package. The anemometers provide pulsed data that is sampled by a data logger every two seconds. Ten minute statistics for wind velocity and all other data acquisition channels are periodically recorded to a non-volatile data file. The recorded data is converted to reflect wind velocity in miles per hour (mph) or in meters per second (m/s) as required. In this Report, wind velocities are first given in the following format – m/s (mph).

1900 NRG #40 Anemometer

(Courtesy NRG Systems)

HCC-1 Anemometer Elevations: 50m (2); 40m (1); 30m (1); 20m (1) and 10m (1)

Note: Orientation information for instrument arms was recorded and made a part of the meteorological tower log.

The anemometer at 10 m for HCC-1 was installed to provide an additional correlation point in order to compare wind data at the test site with data recorded at Springfield.

A consensus transfer function has been adopted by the wind industry for use with this anemometer model; the accuracy of which is estimated at ± 0.2 m/s over the device's operational range.

Wind Vanes are the 1904 NRG #200P devices and are installed on the meteorological tower as noted:

HCC-1 Wind Vane: 50m (1) and 40m (1)

Note: Orientation information for instrument arms was recorded and made a part of the meteorological tower log books.

1904 NRG #200P Wind Vane

(Courtesy NRG Systems)

Temperature sensing is provided by the 1906 NRG #110S device, one temperature sensor was placed on the meteorological tower. The device may be programmed to reflect temperature in degrees Fahrenheit or in degrees Celsius. The sensors are approximately 3m above the ground to minimize the effects of changes in temperature due to ground cover heating at the site.

1906 NRG #110S Temperature Sensor

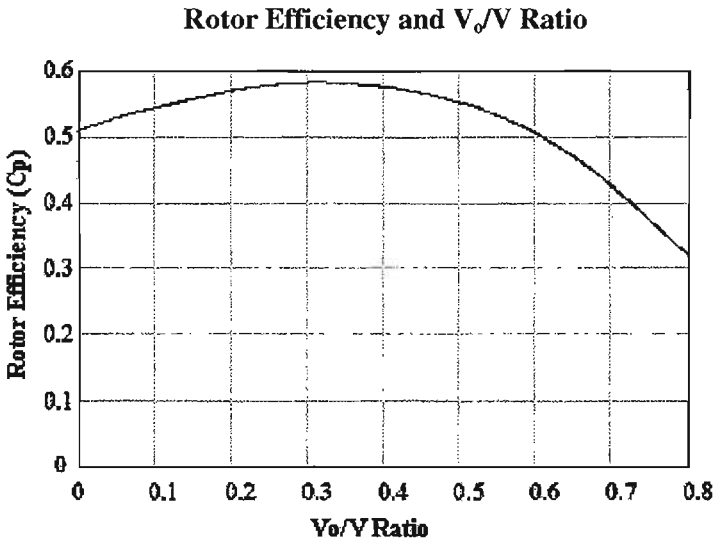
(Courtesy NRG Systems)

3. Factors Affecting Wind Power and Turbine Performance

A wind turbine generator (WTG) captures the energy of the wind using a rotor, having two or more blades, that is mechanically linked to a generator. As the rotor is forced to turn by prevailing winds, mechanical energy is removed from the wind and transferred into rotary mechanical force (torque) in the shaft of the rotor unit. The rated power and the speed of rotation, for a rotor system, is dependent on a number of factors, some of the main ones are…

- Wind velocity
- Swept area, number of rotor blades and solidity
- Blade pitch
- Generator (asynchronous and synchronous)

Each factor has a significant role in rotation speed and net energy capture. The overall efficiency of a rotor to extract energy from the wind has a theoretical maximum of slightly less than 60%; Betz's Law for Airfoils. The graph below plots rotor efficiency as a function of the V_o/V ratio; where V_o is the downwind velocity and V is the upwind velocity relative to the turbine rotor. Depending on the design and manufacture of wind turbine generator, the rotational speed of the rotor must be increased. To accommodate asynchronous generators, a gearbox is used to step-up the rotation speed of the drive shaft to produce a fixed slower rpm on the rotor and a much faster fixed rpm for generator to produce electricity. In the case of a synchronous generator, the drive shaft from the rotor may be directly coupled to the generator without a gearbox, driving the generator at the slower variable speed of the rotor.



Rotor efficiency is not a straight forward topic for the untrained; as an example, when comparing a two-blade rotor system to that of a three-blade unit, the overall efficiency realized by adding the third blade is on average increased by approximately 5%; however, the cost and weight of the three-blade rotor system block is increased disproportionably by 50%, factoring out the rotor hub and internal sub-assemblies.

A discussion on swept area and solidity is appropriate at this point in our discussion. Swept area is the circular area that the tips of the rotor blades form as they spin. The swept area is generally given by the manufacturer in square meters (m^2).

Say we have a wind turbine generator using a three-blade rotor, each blade 27m (88.6ft.) in length. The diameter of the rotor blades forms a circle 54m (177ft.) across the center. Swept area for the example above is calculated using the equation for circular area:

$$\text{Area}_{(\text{circle})} = \frac{\pi D^2}{4} = 2{,}290\ \text{m}^2$$

The concept of rotor swept area is important for determining the amount of energy held by the wind passing over the rotor for a given wind regime as presented in the following paragraph.

Using the swept area figure, we can determine the total power that would be available for conversion by the rotor. Assuming that the power in the prevailing wind, referred to as wind power density (WPD) stated in watts/m^2, at a given moment in time, is determined to be 250 watts (w)/m^2; the total power that a rotor having 100% efficiency could extract becomes,

$$\text{Power}_{(\text{rotor swept area})} = \text{WPD} \times \text{Rotor Swept Area}$$

$$\text{Power}_{(\text{power swept area})} = 250\ \text{w/m}^2 \times 2{,}290\ \text{m}^2 = 572{,}500\ \text{w}\ (572.5\ \text{kW})$$

Few manufacturers offer the option to change the size of a wind turbine generator's rotor. When this option is available, it should be considered carefully; a larger diameter rotor has more wind flowing across the blades, converting more of the wind power into mechanical torque and electricity. The added cost for a larger diameter rotor should be weighed along with the use of higher towers to determine the added economic benefit for a wind turbine project.

Another factor that influences rotor operating dynamics is solidity. To determine the general solidity of the rotor, we must know the amount of active surface area that a rotor blade will have against the prevailing wind. Let us say that the example rotor blades have a surface area of $40m^2$. Since this is a three blade rotor, the total active surface area would then be $120m^2$.

Solidity is the percentage of total blade surface with respect to swept area; therefore, $120m^2$ with respect to 2,290 m^2, we have,

$$\text{Solidity} = \frac{\text{Total Blade Area}}{\text{Total Rotor Swept Area}} \times 100\% = 5.2\%$$

The relationship between the speed of rotor rotation and the number of rotor blades (solidity) is an inverse relationship. That is, as solidity or the number of blades or area is increased, the speed of rotation for a rotor unit operating in a given wind velocity will decrease.

The number and design of the rotor blades is the center focus of the total wind turbine efficiency. Simply stated, the rotor blades are perhaps the most important factor in capturing wind energy. Rotor blades have the distinction of being the least efficient subassembly of the wind turbine generator and account for the greatest energy conversion losses in the entire wind turbine generator system.

The efficiency factor of a rotor (C_p), operating in a wind turbine generator, is not constant. A rotor, independent of the number of blades, will have a maximum or best operating efficiency when the speed of the rotor movement at its outermost tip (tip speed) is a certain multiple of the prevailing upstream wind velocity acting on the rotor. The relationship between tip speed and wind speed is referred to, in the industry, as tip speed ratio (TSR).

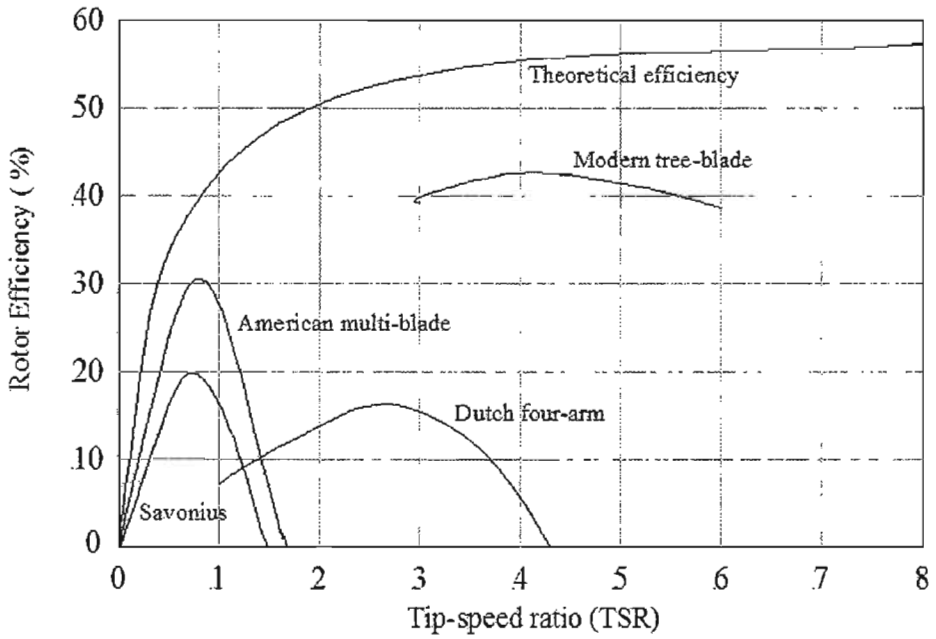
A wind turbine generator having a rotor tip speed of 50 m/s (112 mph) and a prevailing wind velocity of 10 m/s (22 mph) would have a TSR of 5.

$$\text{TSR} = \frac{\text{linear speed of blade outer most tip}}{\text{free upstream wind velocity}} = 5$$

TSR for a model three-blade rotor may vary between 3 and 7 with rotor efficiencies ranging from 0.25 (25%) at the lower and upper limits of the TSR curve, and peaking mid-range at 0.43 (43%). Energy capture is adversely affected when the rotor is operated at less than its optimum TSR.

Maintaining an optimum value for TSR is more challenging for the manufacturers of fixed speed wind turbine generators and less problematic for manufacturers of variable speed machines. Energy capture (kW-h) is a function of rotor efficiency, varying with design, as seen in the diagram presented below.

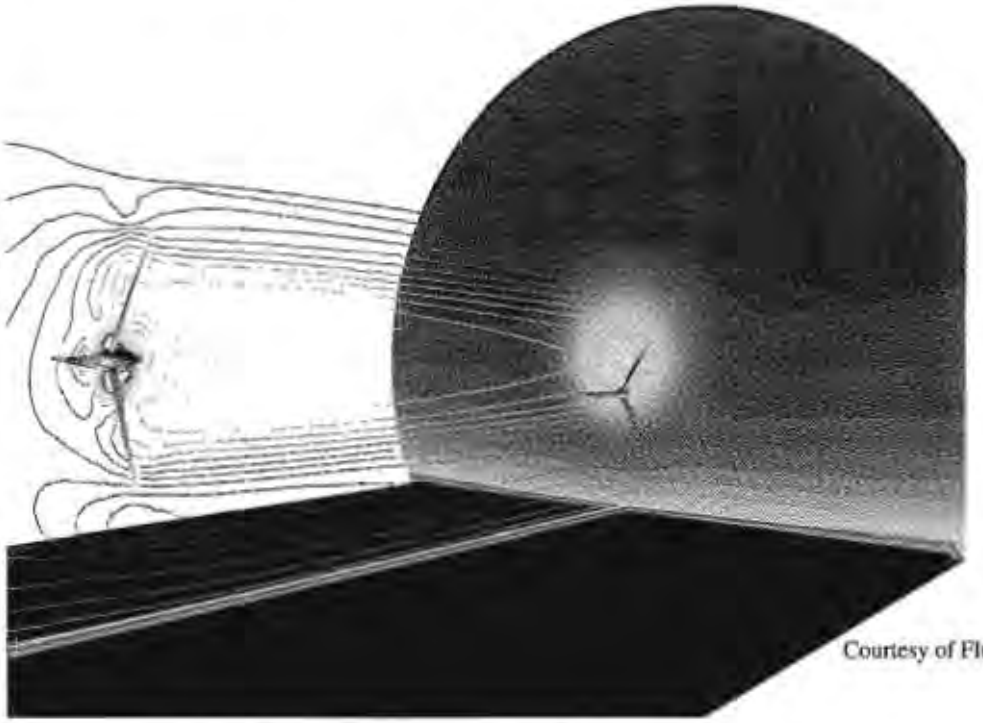
Relative Efficiencies of Various Rotor Designs



As the wind crosses the rotor blades and power extracted from it, the velocity of the wind behind the rotor is reduced in accordance with the efficiency of the rotor design. This will cause a wake or turbulence zone trailing the rotor where the power in the wind will be reduced for an appreciable distance.

Computational fluid dynamics (CFD) is the accepted method for handling turbine wake problems and elements of micro-siting. In the following diagram, the turbine wake zone is shown generating an adverse affect on a second turbine downstream.

Modeling with computational fluid dynamic (CFD) software.



Courtesy of Fluent, Inc.

The amount of mechanical power that is captured by the rotor from the wind is a function of the difference between upstream wind velocity (flowing toward the rotor) and downstream wind velocity (passing behind the rotor). The spacing between wind turbines becomes very important so that each turbine has wind flow that is not significantly reduced in power. The historical wind direction pattern (shown by what is referred to as a wind rose) and the arrangement of multiple turbines (turbine array alignment) must seek to optimize wind flow to each turbine for energy generation.

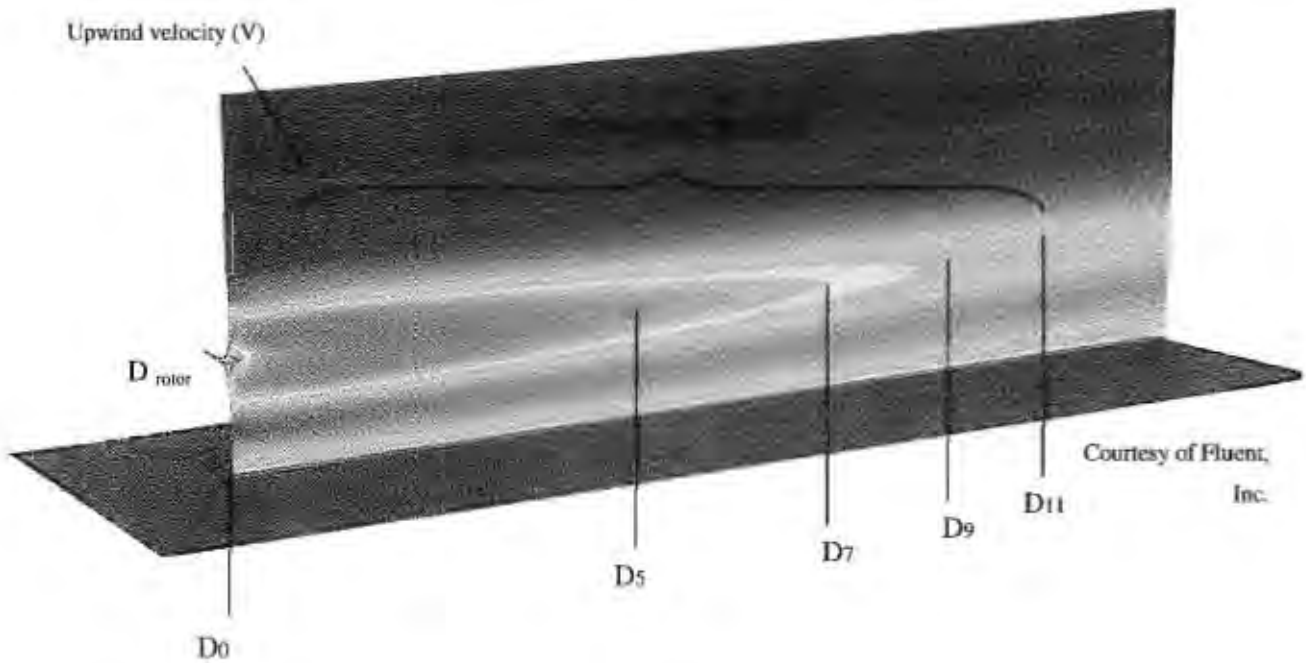
Every practical wind turbine array (multi-turbine placement pattern) design will lose some of the kinetic energy in the wind because of reduced wind flow from one or more turbines, the term for this is "array loss". The key is to lay out the turbine array with special software and engineering to minimize the array losses. In the wind industry, it is not uncommon to find that the distance between rotors perpendicular to the prevailing wind direction from 2 to 5 times the diameter of the rotor (lower rotor distance multiples generally with arrays on ridge formations) are typical. Distances between turbines in the direction of the prevailing wind conservatively range from 8 to 12 times the rotor diameter.

The optimum distance and placement for a wind turbine array is determined by several factors:

- selection of the turbine that will be used
- turbine tower height and rotor size
- wind velocities and wind direction (resource complexity)
- topography of land where project will be built
- amount of land that is available for development
- payment to land owners for use of their property
- array loss percentage project stakeholders would tolerate
- proximity to large buildings and structures

Although array loss will not be a consideration with the installation of a single wind turbine generator at Heartland; wind wake affects from the buildings on campus will have influence on energy capture.

Velocity Magnitude Contours within Turbine Wake



(Approximate rotor diameter multiples added to original diagram)

The placement of a wind turbine at position D_5 within the array plan would produce less energy capture than an identical turbine placed at position D_{11}. In the later position, wind turbulence is lower and has become a

more laminar fluid flow. High wake turbulence will also increase rotor fatigue and failure rates adding increased operational and maintenance costs for the facility.

The energy that is contained in the wind may be found using the following equation:

$$P = \frac{1}{2} \rho V^3 A$$

where P is the mechanical power (kW_{mech}),
ρ is the density of air (1.225 kg/m^3),
A is the area swept by the rotor, and
V is the wind velocity (m/s).

Using the above equation, a wind blowing at an average velocity of 7.0 m/s over a rotor of $1m^2$ will have a wind power density of $210w/m^2$. If we use the rotor having 2,290 m^2 of swept area, the mechanical power in the wind available to the rotor would be 481,100 w (481.1 kW).

The value of mechanical power extracted from the wind when the upstream and downstream wind velocities are known is calculated utilizing the equation:

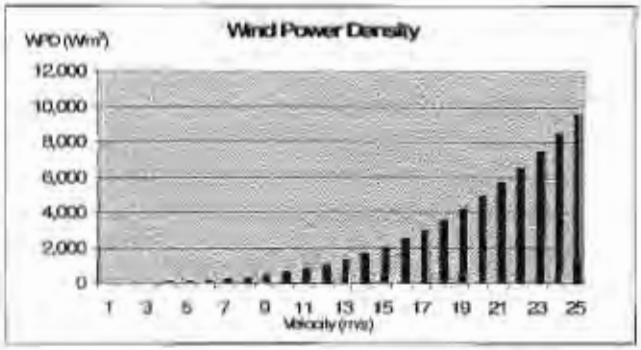
$$P_0 = \frac{1}{2} \rho A \frac{[V + V_0]}{2} \quad V^2 - V_0^2$$

where P_o is the mechanical power extracted (W_{mech}),
V is the upstream wind velocity (m/s), and
V_o is the downstream wind velocity (m/s)

For example, given the upstream wind velocity equal to 7.0 m/s and the downstream wind velocity behind the rotor is measured at 5.0 m/s, the rotor would have captured 201,978 w (201.9kW). The ratio of downwind velocity (V_o) to upwind velocity (V) for this example is 0.714. Inspecting the graph on rotor efficiency (see p.9), we find that the V_o/V ratio of 0.714 intersects with a rotor efficiency of 0.42.

Rotor efficiency can also be determined by dividing mechanical power in the rotor by power in upstream wind. Therefore, taking 201.9 kW (rotor) and dividing by 481.1 kW (upstream), we have an efficiency of 0.42.

Wind velocity is the single most important factor to have when analyzing the potential wind power that would be available for use with wind turbine generators. The relationship of wind power to wind velocity is a cubic (V^3) function.



A thirty percent (30%) increase of wind speed from 10 m/s to 13 m/s will cause the WPD to increase from 613 w/m^2 to 1,346 w/m^2, more than double the available power in the wind.

Wind Power Density Table	
Wind Velocity (m/s)	Wind Power Density (W/m^2)
1	1
2	5
3	17
4	39
5	77
6	132
7	210
8	314
9	447
10	613
11	815
12	1,058
13	1,346
14	1,681
15	2,067
16	2,509
17	3,009
18	3,572
19	4,201
20	4,900
21	5,672
22	6,522
23	7,452
24	8,467
25	9,570

Air density (ρ) is another factor which will influence the amount of energy that a wind turbine generator will glean from the wind. The relationship between air density and energy capture is directly proportional.

Air density is affected by two variables, explicitly, ambient temperature and the barometric (atmospheric) pressure. The traditional equation for finding air density is,

$$\rho = \frac{P}{R\,T}$$

where R is the physical specific gas constant (287 J kg^{-1} K^{-1}),
P is the air pressure in Pascals (Pa) or Newton/m^2 (N/m^2), and
T is the temperature in °K.

From the equation give above, we see that at as the ambient temperature of air increases, the air density will decrease, the inverse is true for increases in barometric pressure. Therefore, wind flow caused by nearby high pressure systems will tend to have greater power available in the wind. It is also reasonable to state cooler climactic and seasonal winds will have increased power relative to other conditions for the region being studied.

This is one of the equations that is used to calculate the power in the wind at a given velocity. It is also the root formula for determining wind power density (WPD) for a test site.

$$WPD = \frac{1}{2n} \sum_{n=1}^{n} \rho\ V^3$$

Rotor swept area is factored out of the basic equation for mechanical power and is not relevant to power density.

It is very important to know the distribution of the wind velocity in terms of the number of hours over a year that wind occurs at a particular velocity. This gives a better calculation of wind power at a given site that is being evaluated. Knowing the average wind speed is helpful, but not as valuable as velocity distribution.

A given wind site may have an average wind speed of 7 m/s. Depending on the distribution of wind, the site may have a good resource or a weaker resource as exemplified in the following example.

Case 1: Mean wind speed 7.0 m/s during a three hour time period.

Hour #1: 5 m/s
Hour #2: 10 m/s
Hour #3: 6 m/s

$P_1 = 0.5 \times 1.225 \times 5^3 = 76 \text{ w/m}^2$
$P_2 = 0.5 \times 1.225 \times 10^3 = 612 \text{ w/m}^2$
$P_3 = 0.5 \times 1.225 \times 6^3 = 132 \text{ w/m}^2$

Mean WPD: 273 w/m^2

Case 2: Mean wind speed 7.0 m/s during three hour time period.

Hour #1: 5 m/s
Hour #2: 5 m/s
Hour #3: 11 m.s

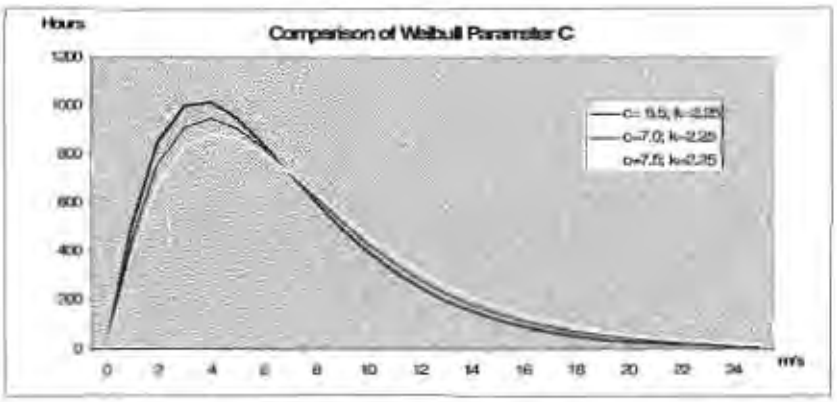
$P_1 = 0.5 \times 1.225 \times 5^3 = 76 \text{ w/m}^2$
$P_2 = 0.5 \times 1.225 \times 5^3 = 76 \text{ w/m}^2$
$P_3 = 0.5 \times 1.225 \times 11^3 = 815 \text{ w/m}^2$

Mean WPD: 322 w/m^2

Both three hour periods have the same average wind speed; the mean equal to 7 m/s. The distribution shown in Case 2 would have more available wind energy for conversion and would have been a better wind resource.

The shape of probability distribution curve for wind is best described by Weibull statistical analysis. A shape factor of 2.00, known as the "Raleigh distribution", approximates the natural distribution pattern for most wind sites.

The following diagram illustrates the difference between variations in the Weibull scale parameter "c" and holding a constant shape parameter "k" = 2.25.



In the graph above, velocity curves are skewed to the right and converge at approximately 7.0 m/s. The higher c-parameter curves have noticeably fewer hours at velocities less than 7.0 m/s; however, and more importantly, they have increased hours at velocities greater than 7.0 m/s. This is important because wind turbine power curves are skewed to the left having greater power output at higher wind velocities.

Conversely, increasing k-parameters tend to have fewer hours at the higher velocities.

4. Overview of Wind Data

This section of the report is a compilation and summary of the significant data collected from the HCC-1 meteorological tower. Tables are provided for anemometer data along with linear and polar graphic diagrams for wind velocity timelines and metrics best described using directional orientation. Additional discussion is given on wind shear and vertical wind profile for the site later in this section.

Tabular Representations

Wind Resource Summary for HCC-1 (07/04/2008 to 07/15/2009)						
Metered Level	50m A	50m B	40m	30m	20m	10m
Mean Wind Seed (m/s)	6.25	6.36	5.97	5.57	5.03	4.05
Median Wind Speed (m/s)	5.80	6.00	5.50	5.10	4.50	3.60
Minimum Wind Speed (m/s)	0.30	0.30	0.30	0.30	0.28	0.23
Maximum Wind Speed (m/s)	26.20	26.20	25.40	24.80	23.10	17.70
Mean Power Density (w/m^2)	260	273	233	198	154	90
Mean Energy Content ($kw\text{-}h/m^2/yr$)	2,278	2,387	2,040	1,734	1,345	790
Weibull k	2.227	2.226	2.170	2.081	1.964	1.773
Weibull c (m/s)	7.06	7.17	6.74	6.30	5.67	4.56
Record Samples (1)	54,246	54,246	54,246	54,246	54,246	54,246

Note (1): A total of 54,246 data records were collected for the 50m, 40m, 30m, 20m and 10m anemometers at HCC-1 and are given in the table above, representing 100% of data for time period. Minor icing caused anemometers and wind vanes to lose data during the recording period. Data for these time periods was replaced with a synthesizing algorithm.

Monthly Average Wind Speed Statistics for HCC-1 (50m A)

Year	Month	Records	Recovery Rate (%)	Mean (m/s)	Min (m/s)	Max (m/s)	SD (m/s)	Weibull k	Weibull c (m/s)
2008	Jul	4,032	100	4.867	0.3	18.9	2.012	2.486	5.457
2008	Aug	4,464	100	4.704	0.3	21.4	1.750	2.850	5.261
2008	Sep	4,320	100	4.721	0.3	12.8	1.997	2.492	5.306
2008	Oct	4,464	100	6.058	0.3	17.1	2.145	2.920	6.743
2008	Nov	4,320	100	6.799	0.3	14.9	2.554	2.913	7.610
2008	Dec	4,464	100	8.271	0.3	24.6	3.828	2.283	9.324
2009	Jan	4,464	100	6.394	0.3	16.5	2.781	2.475	7.220
2009	Feb	4,032	100	7.736	0.3	19.2	3.150	2.641	8.689
2009	Mar	4,464	100	7.348	0.3	26.2	3.508	2.211	8.299
2009	Apr	4,320	100	7.812	0.3	17.0	3.044	2.782	8.783
2009	May	4,464	100	5.777	0.3	16.7	2.504	2.462	6.510
2009	Jun	4,320	100	5.317	0.3	15.4	2.377	2.353	5.988
2009	Jul	2,118	100	4.662	0.3	12.1	1.898	2.628	5.239
All Data		54,246	100	6.254	0.3	26.2	2.956	2.226	7.061

Monthly Average Wind Speed Statistics for HCC-1 (50m B)

Year	Month	Records	Recovery Rate (%)	Mean (m/s)	Min (m/s)	Max (m/s)	SD (m/s)	Weibull k	Weibull c (m/s)
2008	Jul	4,032	100	4.943	0.3	19.2	2.009	2.534	5.543
2008	Aug	4,464	100	4.697	0.3	21.5	1.747	2.843	5.254
2008	Sep	4,320	100	4.739	0.3	12.6	1.993	2.494	5.321
2008	Oct	4,464	100	6.156	0.3	17.4	2.156	2.931	6.845
2008	Nov	4,320	100	6.964	0.3	15.1	2.569	2.967	7.782
2008	Dec	4,464	100	8.414	0.3	24.9	3.881	2.284	9.477
2009	Jan	4,464	100	6.557	0.3	16.7	2.781	2.533	7.396
2009	Feb	4,032	100	7.860	0.3	19.1	3.228	2.607	8.827
2009	Mar	4,464	100	7.455	0.3	26.2	3.590	2.187	8.419
2009	Apr	4,320	100	7.943	0.3	17.2	3.027	2.840	8.916
2009	May	4,464	100	5.938	0.3	17.6	2.564	2.456	6.682
2009	Jun	4,320	100	5.414	0.3	15.4	2.412	2.365	6.097
2009	Jul	2,118	100	4.644	0.3	12.2	1.863	2.673	5.217
All data		54,246	100	6.356	0.3	26.2	2.998	2.225	7.172

Monthly Average Wind Speed Statistics for HCC-1 (40m)

Year	Month	Records	Recovery Rate (%)	Mean (m/s)	Min (m/s)	Max (m/s)	SD (m/s)	Weibull k	Weibull c (m/s)
2008	Jul	4,032	100	4.551	0.3	18.2	1.943	2.397	5.101
2008	Aug	4,464	100	4.255	0.3	20.3	1.590	2.804	4.757
2008	Sep	4,320	100	4.294	0.3	11.9	1.815	2.473	4.819
2008	Oct	4,464	100	5.639	0.3	16.5	2.036	2.816	6.280
2008	Nov	4,320	100	6.583	0.3	14.7	2.489	2.876	7.368
2008	Dec	4,464	100	8.062	0.3	23.9	3.726	2.274	9.078
2009	Jan	4,464	100	6.254	0.3	16.0	2.692	2.488	7.056
2009	Feb	4,032	100	7.484	0.3	18.6	3.114	2.575	8.415
2009	Mar	4,464	100	7.068	0.3	25.4	3.438	2.165	7.984
2009	Apr	4,320	100	7.485	0.3	16.4	2.960	2.735	8.424
2009	May	4,464	100	5.577	0.3	17.0	2.426	2.448	6.286
2009	Jun	4,320	100	5.127	0.3	14.9	2.278	2.376	5.781
2009	Jul	2,118	100	4.404	0.3	11.8	1.726	2.742	4.947
All data		54,246	100	5.970	0.3	25.4	2.892	2.170	6.743

Month Average Wind Speed Statistics for HCC-1 (30m)

Year	Month	Records	Recovery Rate (%)	Mean (m/s)	Min (m/s)	Max (m/s)	SD (m/s)	Weibull k	Weibull c (m/s)
2008	Jul	4,032	100	4.195	0.3000	17.1	1.839	2.338	4.707
2008	Aug	4,464	100	3.963	0.3000	19.0	1.542	2.704	4.438
2008	Sep	4,320	100	3.887	0.3000	11.1	1.697	2.387	4.370
2008	Oct	4,464	100	5.143	0.3000	15.6	1.931	2.730	5.749
2008	Nov	4,320	100	6.170	0.3000	14.2	2.424	2.754	6.920
2008	Dec	4,464	100	7.619	0.2992	22.7	3.586	2.225	8.578
2009	Jan	4,464	100	5.915	0.3000	14.9	2.604	2.434	6.681
2009	Feb	4,032	100	7.049	0.3000	17.9	3.057	2.467	7.942
2009	Mar	4,464	100	6.561	0.3000	24.8	3.372	2.042	7.409
2009	Apr	4,320	100	7.112	0.3000	15.7	2.935	2.621	8.016
2009	May	4,464	100	5.182	0.3000	16.3	2.408	2.283	5.852
2009	Jun	4,320	100	4.796	0.3000	14.3	2.230	2.276	5.418
2009	Jul	2,118	100	4.088	0.3000	11.2	1.696	2.573	4.601
All Data		54,246	100	5.574	0.2992	24.8	2.815	2.081	6.297

Month Average Wind Speed Statistics for HCC-1 (20m)

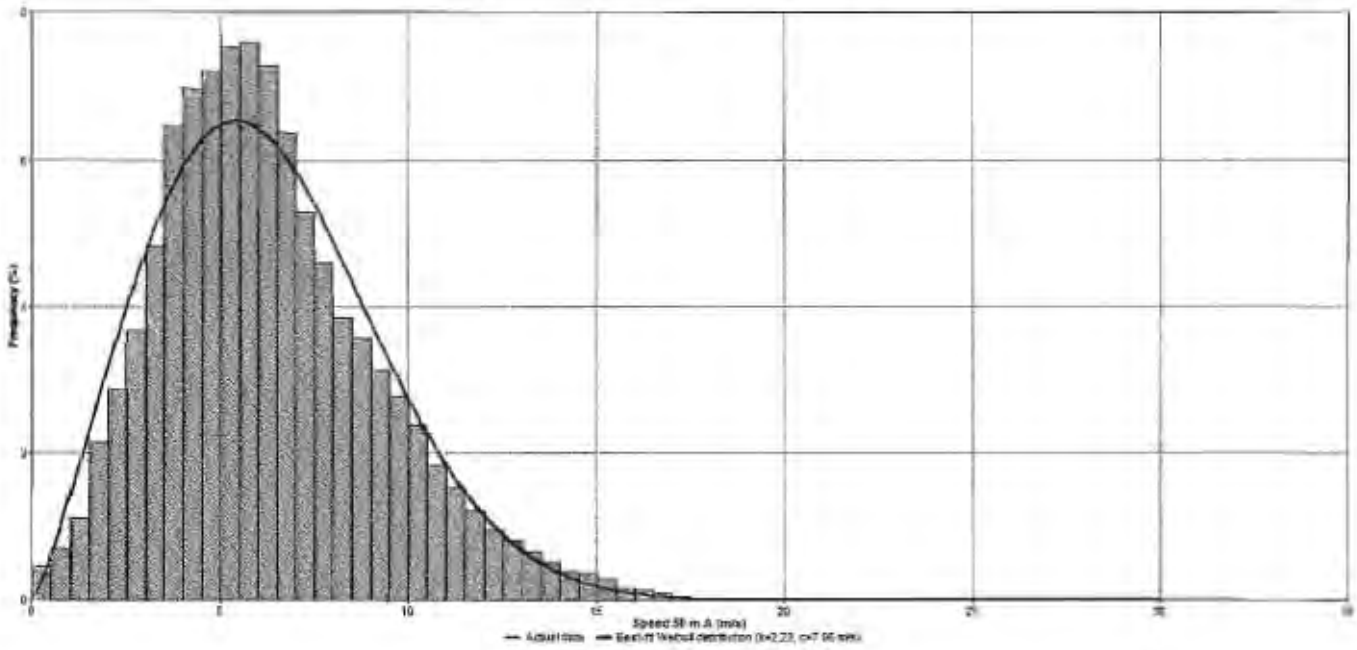
Year	Month	Records	Recovery Rate (%)	Mean (m/s)	Min (m/s)	Max (m/s)	SD (m/s)	Weibull k	Weibull c (m/s)
2008	Jul	4,032	100	3.707	0.3000	15.5	1.724	2.237	4.176
2008	Aug	4,464	100	3.453	0.3000	16.7	1.415	2.564	3.877
2008	Sep	4,320	100	3.442	0.3000	10.5	1.597	2.249	3.878
2008	Oct	4,464	100	4.564	0.3000	14.1	1.797	2.626	5.116
2008	Nov	4,320	100	5.550	0.3000	13.2	2.395	2.429	6.222
2008	Dec	4,464	100	6.991	0.2752	21.0	3.396	2.139	7.867
2009	Jan	4,464	100	5.330	0.3000	13.6	2.411	2.362	6.025
2009	Feb	4,032	100	6.438	0.3000	16.7	2.912	2.353	7.258
2009	Mar	4,464	100	6.088	0.3000	23.1	3.244	1.950	6.860
2009	Apr	4,320	100	6.522	0.3000	15.2	2.827	2.487	7.364
2009	May	4,464	100	4.630	0.3000	15.0	2.223	2.193	5.224
2009	Jun	4,320	100	4.289	0.3000	12.7	2.087	2.150	4.836
2009	Jul	2,118	100	3.570	0.3000	10.4	1.588	2.393	4.026
All Data		54,246	100	5.026	0.2752	23.1	2.679	1.965	5.673

Month Average Wind Speed Statistics for HCC-1 (10m)

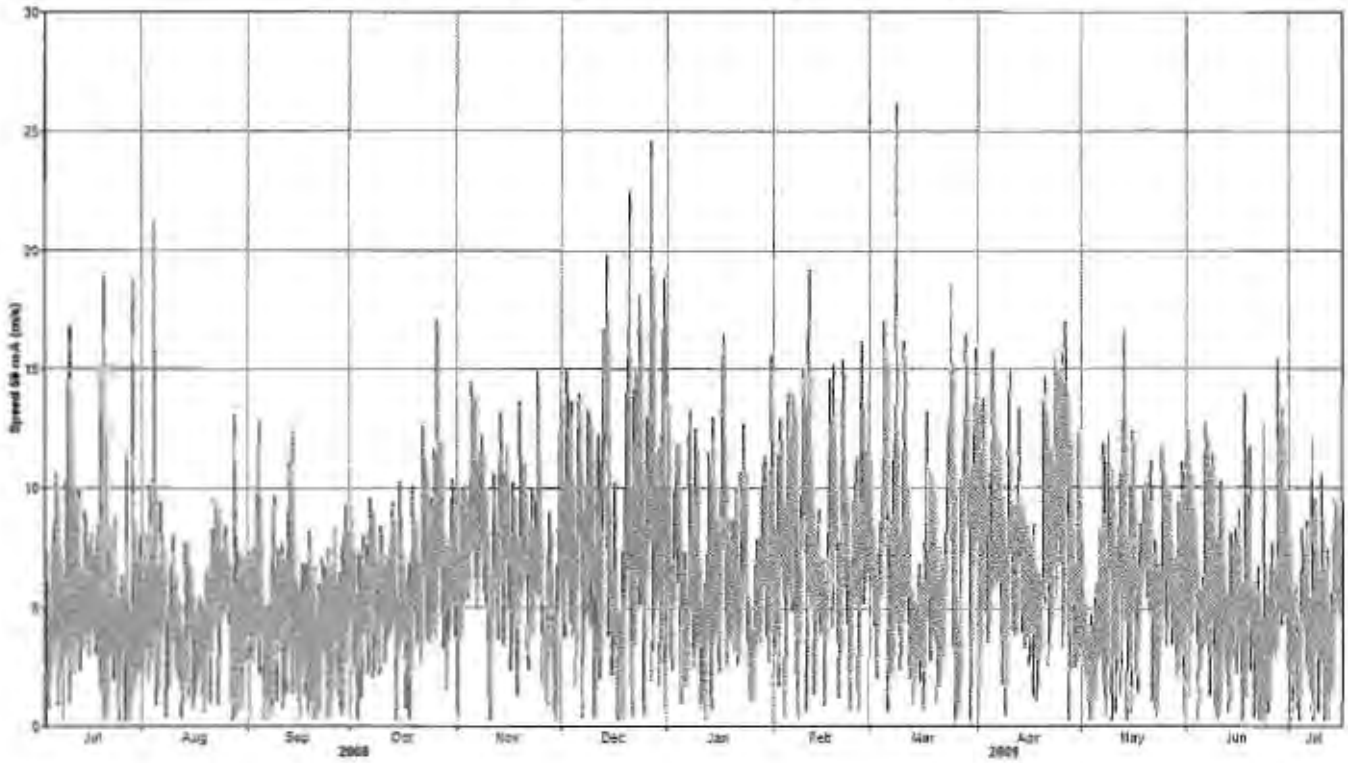
Year	Month	Records	Recovery Rate (%)	Mean (m/s)	Min (m/s)	Max (m/s)	SD (m/s)	Weibull k	Weibull c (m/s)
2008	Jul	4,032	100	2.843	0.3000	12.2	1.513	1.964	3.208
2008	Aug	4,464	100	2.635	0.3000	12.5	1.368	2.014	2.973
2008	Sep	4,320	100	2.591	0.3000	8.6	1.402	1.925	2.921
2008	Oct	4,464	100	3.514	0.3000	11.1	1.513	2.451	3.959
2008	Nov	4,320	100	4.500	0.3000	10.9	2.084	2.251	5.057
2008	Dec	4,464	100	5.948	0.2342	17.7	3.011	2.042	6.693
2009	Jan	4,464	100	4.467	0.3000	11.7	2.124	2.240	5.053
2009	Feb	4,032	100	5.438	0.3000	14.3	2.568	2.249	6.138
2009	Mar	4,464	100	5.085	0.3000	16.7	2.851	1.853	5.727
2009	Apr	4,320	100	5.317	0.3000	13.2	2.546	2.228	6.014
2009	May	4,464	100	3.678	0.3000	12.1	1.889	2.036	4.150
2009	Jun	4,320	100	3.207	0.3000	10.3	1.661	2.030	3.623
2009	Jul	2,118	100	2.758	0.3000	8.6	1.318	2.216	3.116
All Data		54,246	100	4.051	0.2342	17.7	2.382	1.774	4.558

Graphic Representations

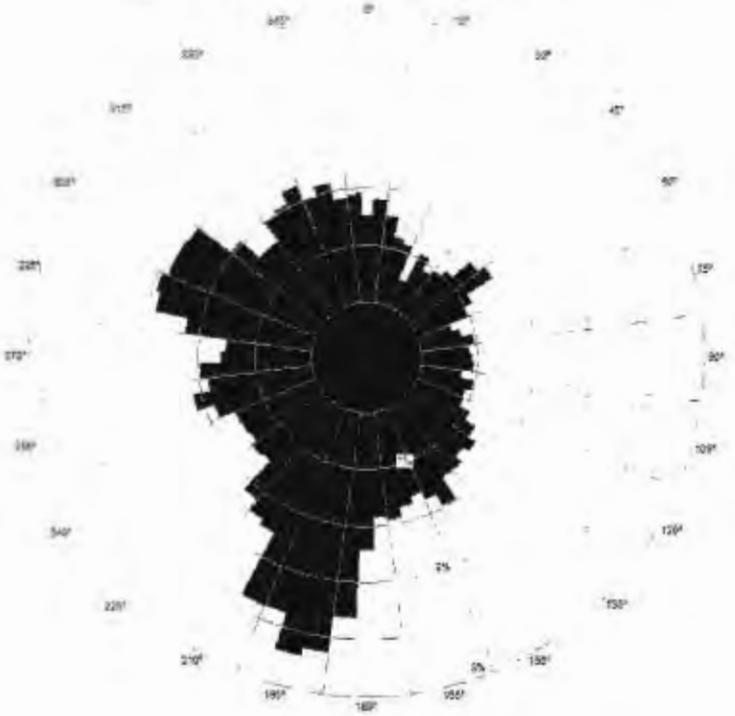
Probability Distribution Function (50m A Data)



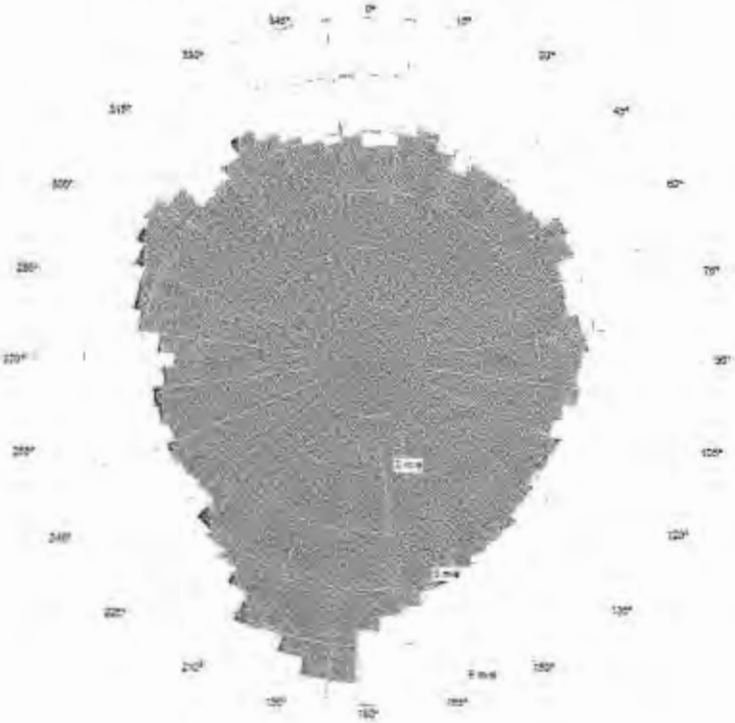
10-Minute Average Wind Velocity (50m A Data)



Frequency by Direction 50mA Data

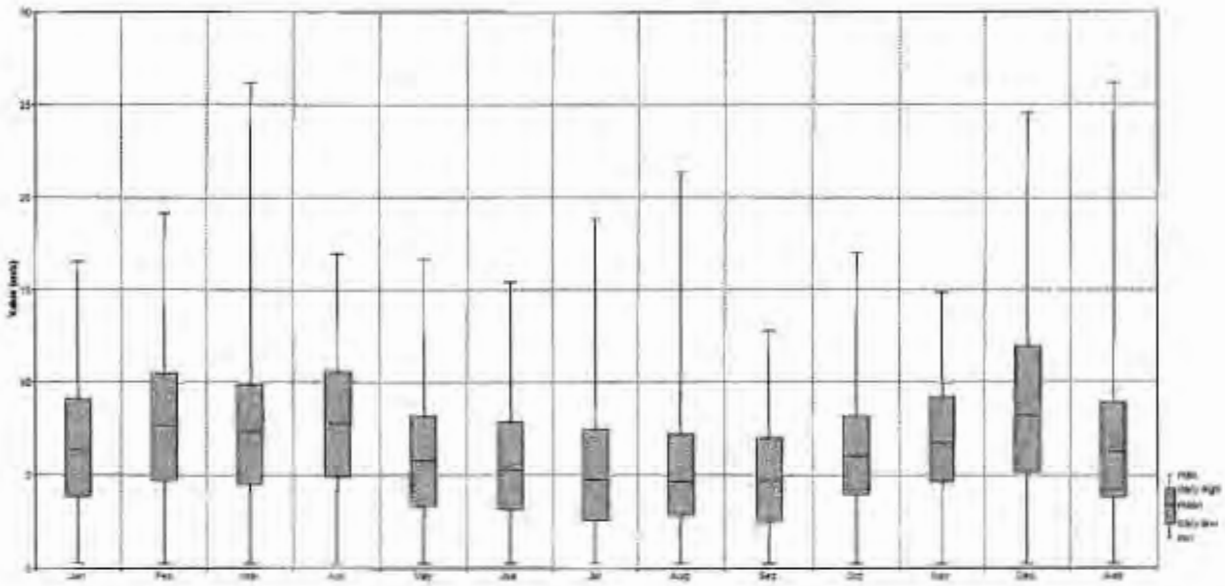


Velocity by Direction (50mA Data)

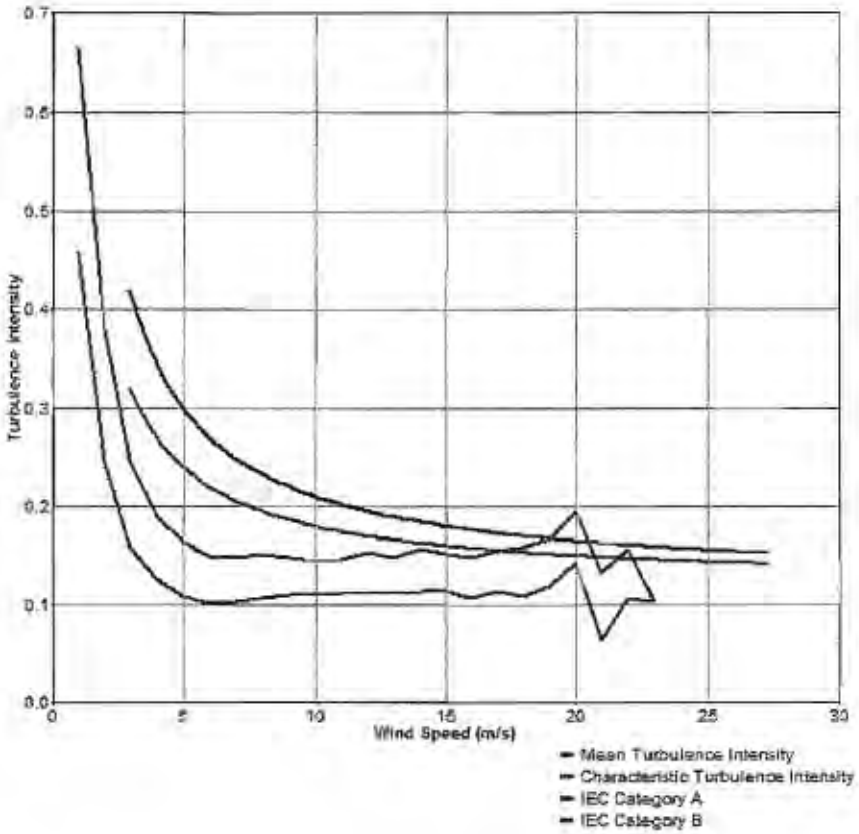


Wind Power Density by Direction (50mA Data)

Box Plot for Wind Velocity (50mA Data)



Turbulence Intensity and Wind Velocity (50mA Data)



Note: Mean and Characteristic Turbulence Intensity values are low at the evaluation metered wind velocities less than 17 m/s.

Vertical Wind Shear Projections

Vertical wind shear describes the change in wind velocity from the ground to the upper levels of the atmosphere where the air flow is more laminar and faster than it is nearer the ground; this is due to ground cover, trees, buildings and topography. The importance of characterizing the wind shear at a given location under consideration for a utility scale wind turbine cannot be overemphasized. Wind shear describes the change of wind velocity as a function of elevation above ground. Understanding wind shear is important because it has a direct impact on the mechanical wind power available for conversion at turbine hub height. Wind shear also causes cyclic loading of the rotor blades. Wind speed is further influenced by season and time of day.

In the white paper *Analysis of Wind Shear Models and Trends in Different Terrains*, Ray, Rogers and McGowan, University of Massachusetts, Renewable Energy Research Laboratory the matter of error in extrapolating wind velocity in high wind shear areas was summarized by…

> *"Several U.S. tall towers wind data sets were used to determine the accuracies of different wind shear methods, especially for sites having hills or heavy wooded forests. The results showed that the most accurate predictions for hub height wind speed characterizations were obtained when only wind speed data greater that 4 m/s (8.94 mph) were considered. Based on a statistical analysis of the prediction errors, there was no significant difference between the performance of the log and power laws using either may result in inaccurate predictions of hub height mean wind speeds."*

The two most common methods of estimating wind shear, previously mentioned above, are the Logarithmic (log) law and the Power law. The Logarithmic law is founded on the principles of boundary layer airflow. The law is expressed by the equation:

$$\frac{U(z)}{U(z_r)} = \frac{\ln\left(\frac{z}{z_0}\right)}{\ln\left(\frac{z_r}{z_0}\right)}$$

where z is the target height,
z_r is the reference height,
$U(z)$ is the target velocity,
$U(z_r)$ is the reference velocity, and
z_0 is the surface roughness length.

Surface roughness (Z_o) is a length parameter that is used to characterize wind shear, being the theoretical height above ground where the wind s peed would be 0 m/s (0 mph). Surface roughness length parameters are provided in the following table for stable atmospheric conditions.

Data recorded from the HCC-1 meteorological tower had an overall roughness length of 0.545 m. This value seemed elevated and may have been the result of the near occurrence of trees and shrubs, site construction, nearby campus buildings, and crop growth. When analyzed against direction, surface roughness varied between 0.2 m and 1.5 m depending on direction and the time of year. Higher values for roughness were seen during crop season.

SURFACE ROUGHNESS VALUES VARIOUS TERRAINS

Description of Terrain	Surface Roughness Length Z_0 (m)
Very smooth, ice or mud	0.00001
Calm open sea	0.0002
Rough sea	0.0005
Snow cover	0.003
Lawn grass	0.008
Rough pasture and grazing land	0.01
Fallow field	0.03
Crops	0.05
Scattered Trees	0.1
Trees, hedges and scattered buildings	0.25
Forest and woodland	0.5
Suburbs	1.5
City centers with tall buildings	3.0

It is significant to note that Z_o, surface roughness length, is more a corrective quantity than a physical quantity; approximately $1/20^{th}$ of the length of roughness components at the area surrounding the test site, e.g., $Z_o = 1$ m is describing roughness elements which may average 20 m in actual length.

The logarithmic law becomes mathematically undefined when the wind speed at two differing elevations is the same or equal. On occasion, wind speed may decrease with height causing the surface roughness estimates to be unrealistically high. The logarithmic law is popular among European wind developers. Variations to the fundamental equation maybe used to adjust for terrain and ground cover at a particular site. In the United States, the power law method is widely used.

It is an empirically developed relationship given by the following equation.

$$\frac{U(z)}{U(z_r)} = \left(\frac{Z}{Z_r}\right)^{\alpha}$$

where Z is the target height,

Z_r is the reference height,

$U(z)$ is the target velocity,

$U(z_r)$ is the reference velocity: and

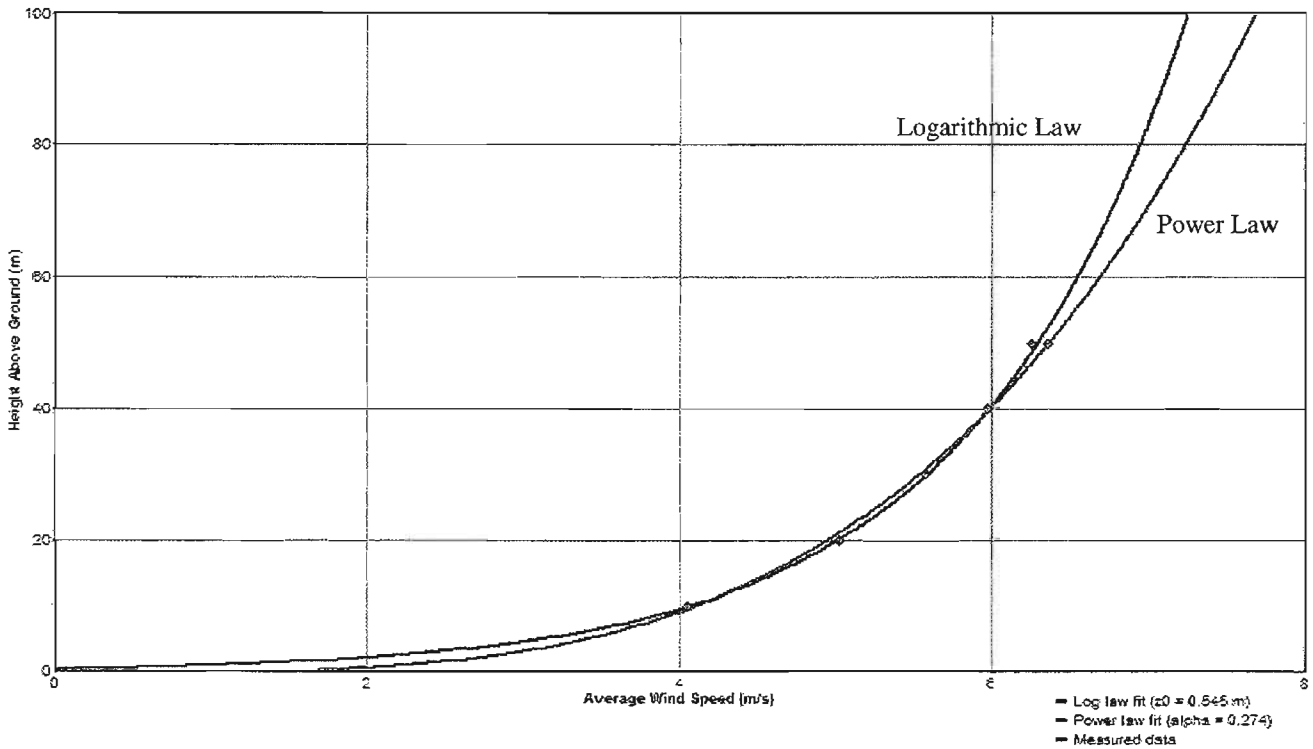
α is the power law exponent.

POWER LAW EXPONENTS FOR VARIOUS TERRAINS

Terrain Description	Power Law Exponent (α)
Smooth hard ground, lake, or ocean	0.10
Short grass on untilled ground	0.14
Level ground with foot-high grass	0.16
Tall row crops, hedges, a few trees	0.20
Many trees with occasional buildings	0.22 – 0.24
Wooded country, small towns and suburbs	0.28 – 0.30
Urban areas with tall buildings	0.4

The calculated power exponent (α) for HCC-1 was 0.274 over the elevations of 10 m to 50 m. The logarithmic and power law methods were applied to the data collected from the HCC-1 meteorological tower and extrapolated wind velocities were derived. The result was the projected wind speeds for elevations of 80 m and higher as depicted by the following set of curve fits provided in the diagram on the following page.

Vertical Wind Shear Projections HCC-1



Elevation	Logarithmic Law	Power Law
80m	6.95 m/s (15.5 mph)	7.24 m/s (16.2 mph)
100m	7.26 m/s (16.2 mph)	7.69 m/s (17.2 mph)

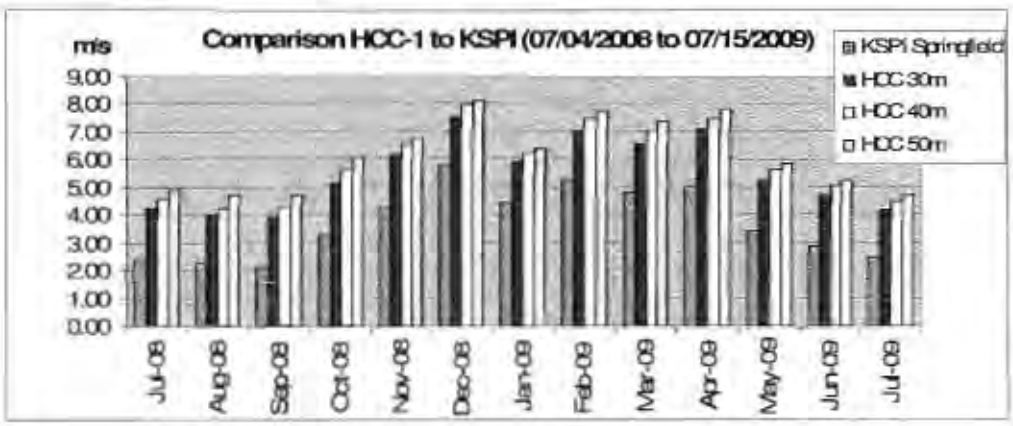
5. Historical Wind Data and Probability

Generally, wind velocities decrease during the summer months and improve during the transitional months of cooling. Wind power density is further improved during the winter months as ambient temperature decreases, resulting in higher air densities, which have a directly proportional relationship to wind power that would be converted by the wind turbine generator. Wind data from weather reporting station WBAN FAA/AWSS Station No. 93822 located at Springfield Capitol Airport (KSPI) was used to estimate intermediate-term wind speeds at 80 m for HCC-1. Data from KSPI was gathered from the station commencing with January 1, 1990 thru July 15, 2009: the data was correlated with the anemometers installed onto HCC-1.

Linear Correlation Results for Monthly Wind Velocities:

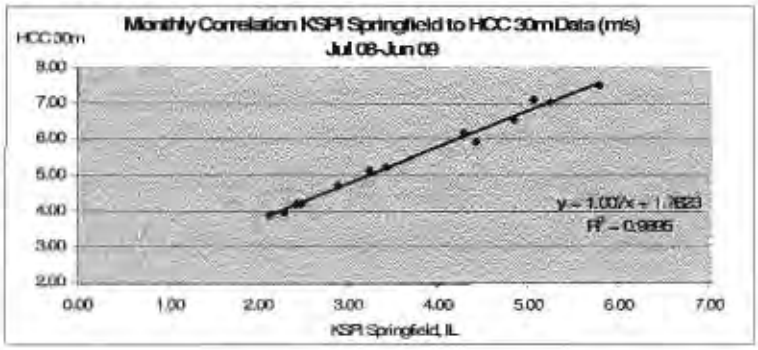
KSPI to HCC-1 10 m	Anemometer	$y = 0.9209x + 0.5687$	$r^2 = 0.9964$
KSPI to HCC-1 20 m	Anemometer	$y = 0.9756x + 1.3357$	$r^2 = 0.9893$
KSPI to HCC-1 30 m	Anemometer	$y = 1.007x + 1.7623$	$r^2 = 0.9895$
KSPI to HCC-1 40 m	Anemometer	$y = 1.0348x + 2.0524$	$r^2 = 0.9861$
KSPI to HCC-1 50 m (A)	Anemometer	$y = 0.9937x + 2.4821$	$r^2 = 0.9722$
KSPI to HCC-1 50 m (B)	Anemometer	$y = 1.0329x + 2.4405$	$r^2 = 0.9752$

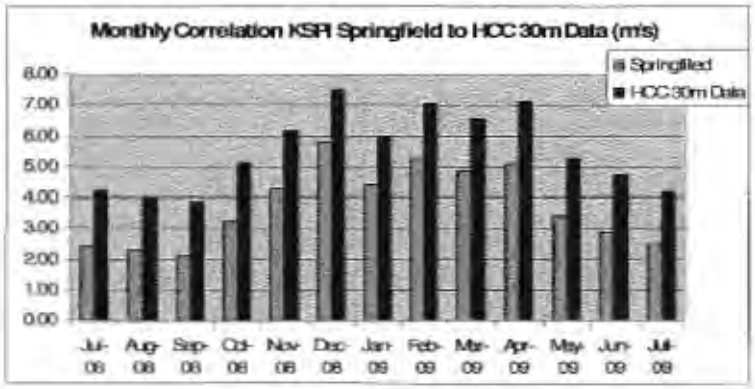
The monthly dataset correlation between KSPI and the 10 m Anemometer was found to be the closest; therefore, that correlation equation was used to estimate intermediate-term wind velocities likely to have been at the HCC-1 site at elevation of 10 m. The tower anemometers were also correlated between each level anemometers were installed, the more significant levels of interest being 30 m, 40 m and 50 m.



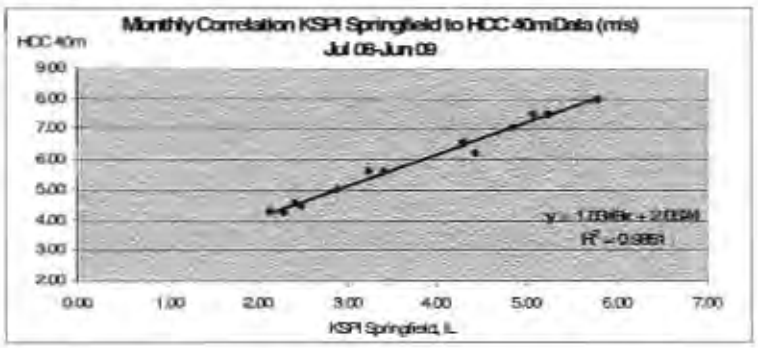
Correlation of HCC-1 Anemometers to KSPI Data

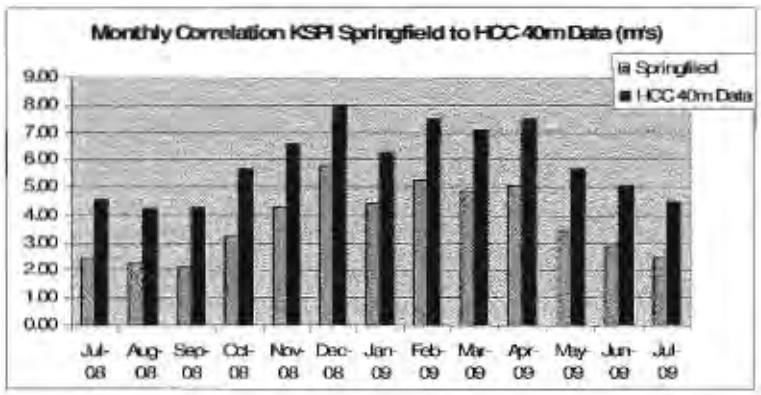
1) Anemometer at 30m to KSPI



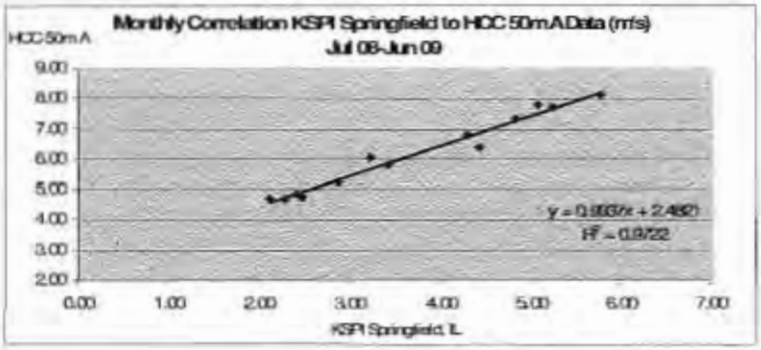


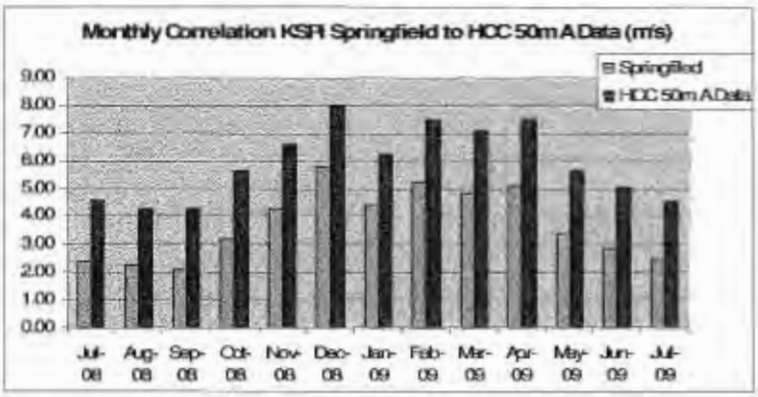
2) Anemometer at 40m to KSPI



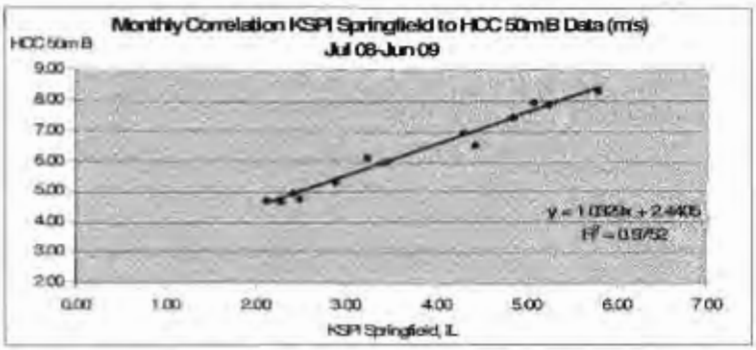


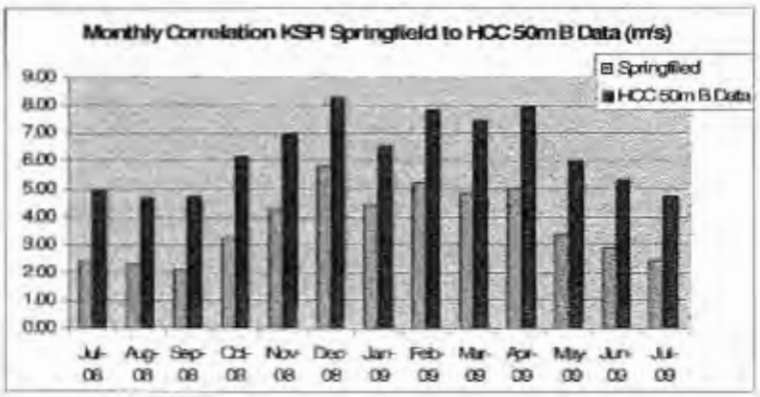
3) Anemometer at 50mA to KSPI





4) Anemometer at 50mB to KSPI



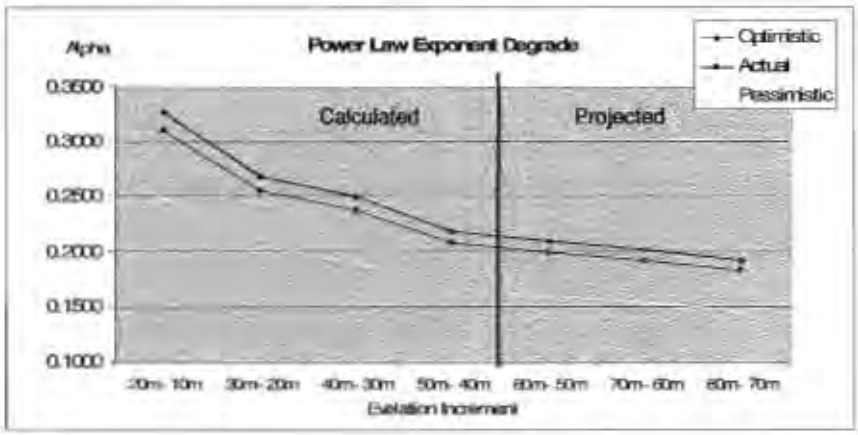


Estimating Historical Wind Velocities at HCC-1

The average annual wind velocity was compiled from the average daily wind velocity for each of the twenty years of data reviewed. Power Law exponents calculated using all metered data levels on the HCC-1 meteorological tower were used to project what the wind regime would have been over the same period of time. The best fit Power Law exponent for the site across the 10 m to 50 m levels was calculated to be: α = 0.2740. When all metered data was considered and incorporated into the calculations, the exponent was reduced as data from the lower anemometer elevations was removed. Applying the adjusted power law exponents to pessimistic, realistic and optimistic projections the following estimates for wind velocities at 60m and 80m were obtained. The results are given in the graph under the table.

Alpha Exponent Values Used in Estimating Wind Velocities

Elevation Increments	HCC-1			Projected		
	Optimistic	Realistic	Pessimistic	Optimistic	Realistic	Pessimistic
$\alpha_{10\ m-20\ m}$	0.326550	0.311000	0.248800	N/A		
$\alpha_{20\ m-30\ m}$	0.267750	0.255000	0.204000			
$\alpha_{30\ m-40\ m}$	0.249900	0.238000	0.190400			
$\alpha_{40\ m-50\ m}$	0.218400	0.208000	0.166400			
$\alpha_{50\ m-60\ m}$	N/A			0.210000	0.200000	0.160000
$\alpha_{60\ m-70\ m}$				0.201600	0.192000	0.153600
$\alpha_{70\ m-80\ m}$				0.191625	0.182500	0.153600



Probability Table for Velocity Extrapolation

Prob.	Ref.	KSPI	30m	40m	50mA	Optimistic (60m)	Realistic (60m)	Pessimistic (60m)	Optimistic (80m)	Realistic (80m)	Pessimistic (80m)
99	1998	3.55	5.34	5.73	6.01	6.21	6.18	6.07	6.51	6.42	6.10
95	1994	3.60	5.39	5.78	6.06	6.26	6.23	6.12	6.56	6.47	6.15
	2002	3.60	5.39	5.78	6.06	6.26	6.23	6.12	6.56	6.47	6.15
90	1995	3.61	5.40	5.79	6.07	6.27	6.24	6.13	6.57	6.49	6.16
	2001	3.63	5.42	5.81	6.09	6.30	6.26	6.15	6.60	6.51	6.18
	2009*	3.65	5.44	5.83	6.11	6.32	6.29	6.17	6.62	6.53	6.20
75	2003	3.70	5.49	5.88	6.16	6.37	6.34	6.22	6.67	6.58	6.25
	1999	3.71	5.50	5.89	6.17	6.38	6.35	6.23	6.68	6.59	6.26
	2000	3.71	5.50	5.89	6.17	6.38	6.35	6.23	6.68	6.59	6.26
	1993	3.80	5.59	5.98	6.26	6.47	6.44	6.32	6.78	6.69	6.35
50	1997	3.81	5.60	5.99	6.27	6.48	6.45	6.33	6.79	6.70	6.36
	1992	3.85	5.64	6.04	6.31	6.52	6.49	6.37	6.83	6.74	6.40
	2007	3.88	5.67	6.07	6.34	6.55	6.52	6.40	6.86	6.77	6.43
	2005	3.97	5.76	6.16	6.43	6.64	6.61	6.49	6.96	6.87	6.52
	1996	3.99	5.78	6.18	6.45	6.67	6.63	6.51	6.98	6.89	6.54
	2006	4.08	5.87	6.27	6.54	6.76	6.72	6.60	7.08	6.98	6.63
	2008	4.08	5.87	6.27	6.54	6.76	6.72	6.60	7.08	6.98	6.63
	2004	4.15	5.94	6.35	6.61	6.83	6.80	6.67	7.16	7.06	6.70
	1990	4.35	6.14	6.55	6.80	7.03	7.00	6.87	7.37	7.27	6.91
	1991	4.35	6.14	6.55	6.80	7.03	7.00	6.87	7.37	7.27	6.91
Statistics: 20 year dataset											
Min		3.55	5.34	5.73	6.01	6.21	6.18	6.07	6.51	6.42	6.10
1st Q		3.60	5.43	5.82	6.10	6.31	6.28	6.17	6.61	6.52	6.20
Median		3.81	5.59	5.99	6.26	6.48	6.44	6.33	6.78	6.69	6.36
Mean		3.85	5.64	6.04	6.31	6.52	6.49	6.37	6.84	6.74	6.41
3rd Q		4.01	5.80	6.20	6.47	6.69	6.66	6.53	7.01	6.91	6.57
Max		4.35	6.14	6.55	6.80	7.03	7.00	6.87	7.37	7.27	6.91
IQR		0.37	0.37	0.38	0.37	0.38	0.38	0.37	0.40	0.39	0.37

Note*: Partial recording of annual data KSPI during 2000 and for HCC-1 during 2009

6. Wind Turbine Generator Criteria

Manufacturers offer a growing number of choices and options for proponents and developers of wind turbine generating facilities, not only at a fundamental level, for example rigid or more compliant structural design concepts, and fixed or variable speed operation. AESI maintains and periodically updates a database of more than 50 manufacturers of wind turbine generator systems. Mechanical system evaluation focused on rotor pitching and yaw control, maintenance and serviceability. In general, preference was afforded to manufacturers having tower options achieving rotor hub heights of 80 m and standard wind velocity survival ratings.

WTGS Subsystem and Design Evaluation Criteria

Mechanical System

- Rotor
- Blades
- Color and Reflectivity
- Pitch Control
- Nacelle
- Yaw Control
- Drive Train
- Suspension and Bearings
- Tower
- Maintenance and Serviceability
- Corrosion Protection

Electrical System

- Principles of Operation
- Standard/Special Configurations
- Integrated Grid Protection Schemes
- Major Components
- Generator Type
- Converter (Inverter)
- External Electrical/ Grounding
- House Load

Safety

- IEC WTGS Class Parameters
- Temperature Range (Operating and Structural)
- General Fail-Safe Breaking
- Safety Chain (Hard-wired and MPU Supervisory)
- Equipment
- Lightning
- Fire

Wind Turbine Control

- Control System and SCADA
- Cut-in and Cut-out Strategy
- Blade Icing Detection Strategies

AESI anticipates that material and installation costs associated with additional hub-height extending past 80 m (262.4 ft) would be of marginal benefit to Heartland. An economic decision on turbine hub-height can be rendered as a part of the RFP process.

Wind turbine electrical systems were reviewed from the standpoint of generator operation under less than nominal and nominal power output operation, the type of generator configuration (WRIG, synchronous, asynchronous, and permanent magnet) and inverter type. Attention was given to distribution grid interconnection protection settings and to direct tie lower-voltage systems; for example, in the case of fixed speed non-inverter units, the triggering events such as under-voltage and over-voltage, over-frequency and under-frequency, other events including grid-voltage or single or multiple phase drops, phase shift, and power factor.

Wind turbine generator safety-related issues are addressed by International Standard IEC 64100-1 prepared by the IEC Technical Committee No. 88: Wind Turbine Generator Systems. The International Electro-technical Commission (IEC) is a worldwide organization which is composed of national committees for achieving and maintaining standardization of the electrical and electronic fields through collaboration, and publishes International Standards. In IEC 64100-1, Section 6 - External Conditions, guidelines are given to address extreme environmental limits for wind and ambient temperature with respect to wind turbine survival.

Wind conditions at HCC-1 site, at times, are strong. Factors such as maximum sustained wind velocity and wind gust velocity were reviewed, as permitted by the available data. Local wind data for the Normal-Bloomington has been digitized by NCDC for the past five years; and, as such, did not provide for efficient analysis of higher wind conditions. This analysis does not factor a tornado occurrence having the potential to cause severe and or catastrophic damage to a wind turbine generator.

Data from the HCC-1 tower and Springfield was used to estimate the recurrence of high wind conditions.

Location	Period	Maximum Recorded Velocity
HCC-1 50m	07/04/2008 to 07/14/2009	34.1 m/s (76.2 mph)
KMBI (Normal)	01/01/1990 to 07/14/2009	39.34 m/s (88.0 mph)
KSPI (Springfield)	01/01/1990 to 07/14/2009	41.12 m/s (92.0 mph)

Note: KMBI dataset was taken from public domain resource and not validated by NCDC. Substantial data for the calendar year 2000 was not available from the public resource.

The Gumbel distribution method is commonly used to estimate return occurrence of extreme values for wind and temperature based on recorded site data. The Gumbel function does not predict the maximum velocity of wind. Using a limited dataset from anemometer level 50m (B) on the HCC-1 tower does not provide a reliable basis for determining the wind velocities for a given return period; as this calculation resulted in a 41.0 m/s (91.7 mph) velocity 50 year return velocity.

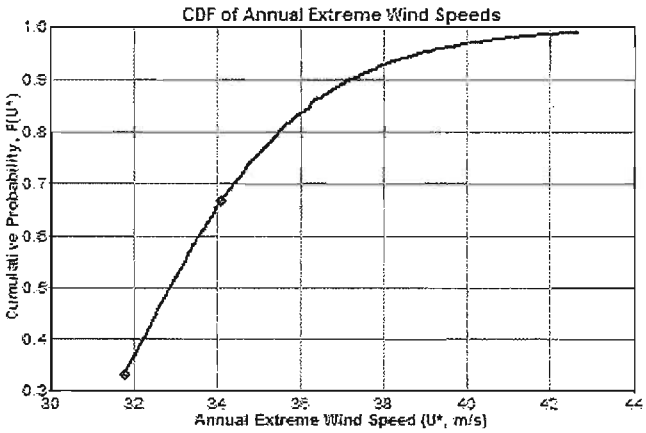
The KMBI Normal-Bloomington dataset (non-validated) for a 50 year return period returned 40.6 m/s (90.8 mph); adjusting to 80m for ground level recording at KMBI and using an estimated Power Law exponent (α = 0.16000), a velocity of 56.6 m/s (126.6 mph). Similar computations for the KSPI Springfield region infer a 50 year return period velocity of 40.4 m/s (90.4 mph) at ground elevation; although, data was not validated by NCDC. Applying the same Power Law parameters infers a 50 year return period velocity of 44.5 m/s (99.5 mph) adjusted to 62.0 m/s (138.7 mph) at 80m. In the event the region experiences tornado activity, the likelihood of significant equipment damage or even destruction is a very real possibility. Appropriate equipment liability and property casualty insurance should be carefully considered by Heartland for extenuating wind and weather conditions.

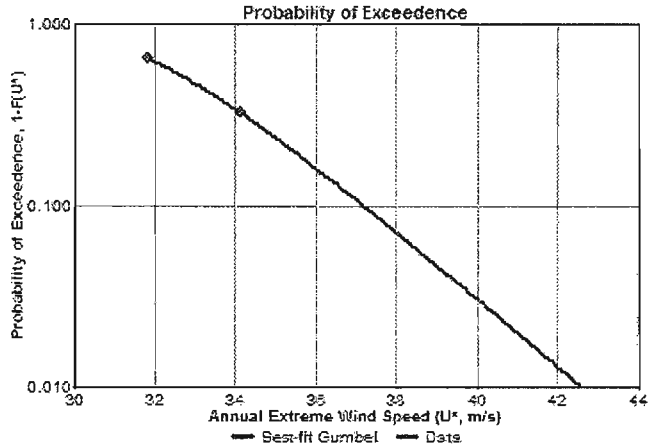
Realistically, high wind conditions are primarily the result of weather systems that are severe, unstable and largely unpredictable with regard to maximum sustained gusts and maximum gusts. The Gumbel function cannot predict the highest wind velocity that will occur on a given test site; but the function can provide insight to what might occur over a period of time.

For the Gumbel function results, please refer to the graphs on the next page.

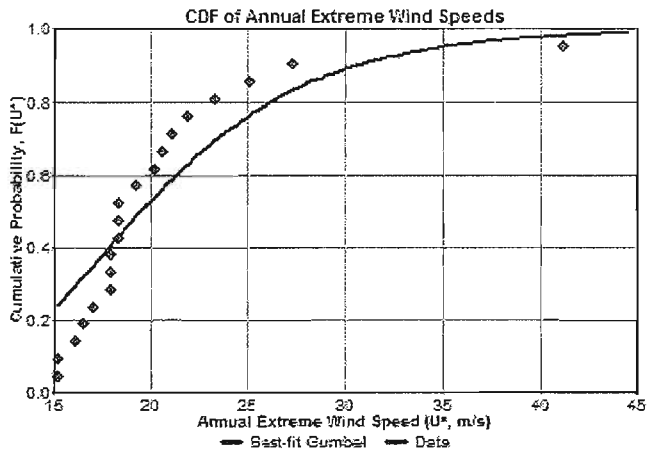
GUMBEL ANALYSIS

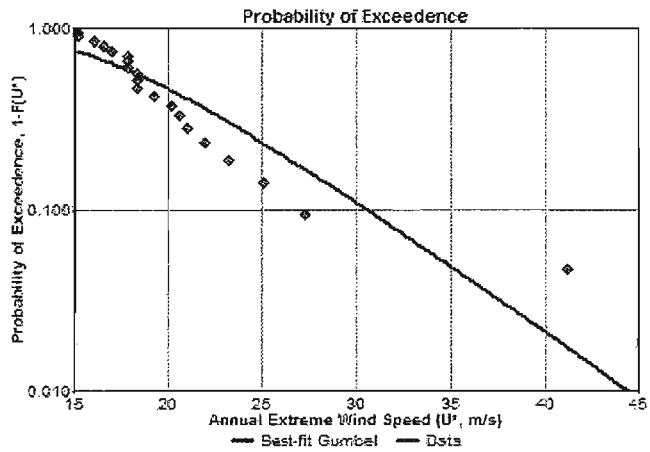
HCC-1





SPRINGFIELD





WTGS Classes

The IEC standard is relevant for the project development site being proposed. The wind velocities and ambient temperature conditions meet the engineered limits of several IEC WTGS Classes. IEC Class III (A and B) WTG units would be marginally acceptable at the proposed project site based on IEC standards for V_{ref} (10-minute reference), V_{ave} (average annual wind velocity at 80m), and temperature. IEC Class II units would be a more conservative choice and it could be argued that this class would have better operational endurance should $V_{ave} > 7.5$ m/s at 80m, in a given 12-month period. Class I units could be also be used, but the added cost in material, and, compromise in energy capture, may not make the group a good choice.

IEC-64100-1 Basic Parameters for WTGS Classes

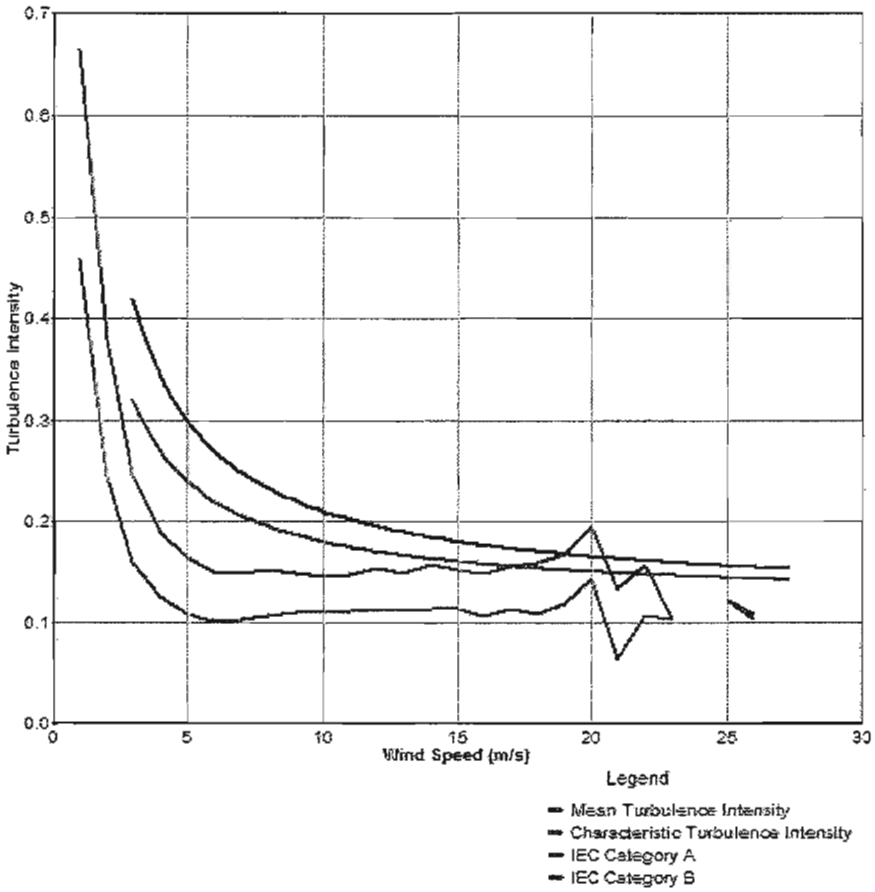
WTGS Class	I	II	III	IV	S
V_{ref} (m/s)	50	42.5	37.5	30.0	Values specified by Manufacturer
V_{ave} (m/s)	10	8.5	7.5	6.0	

where V_{ref} is the reference wind velocity averaged over 10-minutes and

V_{ave} is the annual average wind velocity at hub-height

Due to the nature of datasets being reviewed, long-term estimates on wind turbulence intensity without actual meteorological tower data; therefore, arriving at a determination for appropriate wind turbulence (sub-category A or sub-category B) cannot be accurately achieved without Heartland acquiring actual long term meteorological data for wind velocity at several levels of monitoring. The following graph illustrates the standard deviation for 50 m data measured at the HCC-1 site and shows turbulence to be within Class A and Class B ratings for short term data recorded.

Mean and Characteristic Turbulence (HCC-1)



IEC Sub-category A and B require that Characteristic Turbulence for the wind regime not to exceed a value of 0.1800 and 0.1600, respectively, at $I_{15m/s}$ (the characteristic value of the turbulence intensity at 15 m/s). The HCC-1 tower data for the period of monitoring had the following values.

HCC-1 Turbulence Bins and Related Turbulence Intensities
(07/04/2008 – 07/15/2009)

Bin Midpoint	Low End (m/s)	High End (m/s)	Records	Stand. Dev. (m/s)	Mean Turbulence Intensity	Stand. Dev. Turbulence Intensity	Characteristic Turbulence Intensity
1	0.5	1.5	989	0.457	0.460	0.205	0.665
2	1.5	2.5	2719	0.477	0.244	0.137	0.380
3	2.5	3.5	4617	0.470	0.158	0.088	0.246
4	3.5	4.5	7292	0.496	0.125	0.064	0.189
5	4.5	5.5	7997	0.541	0.109	0.055	0.164
6	5.5	6.5	8067	0.609	0.102	0.047	0.150
7	6.5	7.5	6328	0.715	0.103	0.046	0.149
8	7.5	8.5	4588	0.846	0.107	0.046	0.153
9	8.5	9.5	3633	0.987	0.111	0.038	0.148
10	9.5	10.5	2797	1.090	0.110	0.035	0.145
11	10.5	11.5	1831	1.225	0.112	0.035	0.147
12	11.5	12.5	1185	1.344	0.113	0.041	0.153
13	12.5	13.5	802	1.458	0.113	0.036	0.149
14	13.5	14.5	492	1.578	0.113	0.044	0.157
15	14.5	15.5	354	1.698	0.114	0.038	0.152
16	15.5	16.5	164	1.703	0.107	0.042	0.149
17	16.5	17.5	76	1.911	0.113	0.042	0.156
18	17.5	18.5	19	1.926	0.108	0.051	0.159
19	18.5	19.5	15	2.267	0.120	0.047	0.167
20	19.5	20.5	8	2.862	0.143	0.052	0.195
21	20.5	21.5	8	1.337	0.064	0.068	0.132
22	21.5	22.5	7	2.371	0.107	0.051	0.158
23	22.5	23.5	1	2.400	0.104	0.000	0.104
24	23.5	24.5	0	2.400	0.104	0.000	0.104
25	24.5	25.5	1	3.000	0.122	0.000	0.122

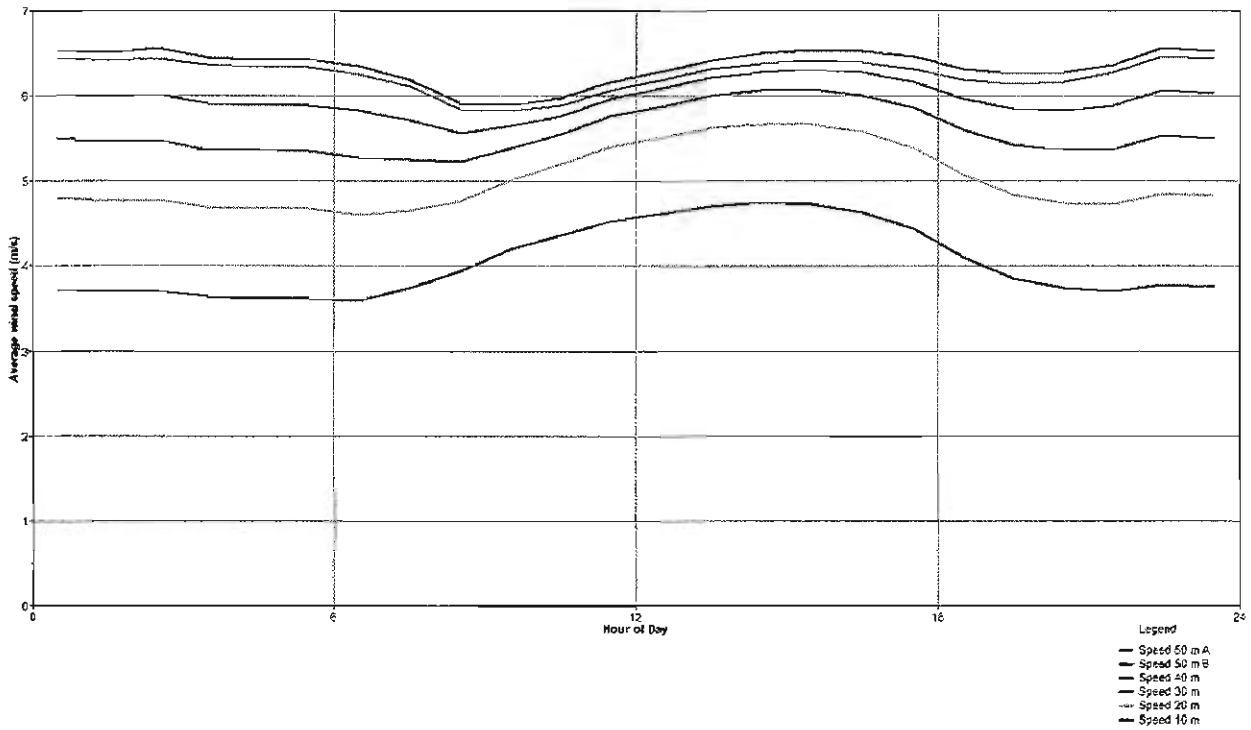
The measured values for the period specified have a characteristic turbulence intensity of 0.152 which are within the threshold of both sub-class A and B of the IEC standard. Notable turbulence intensity occurred in calendar 2008; specifically, in the months of July, August and December.

The manufacturer's load engineer will need to render the final determination on Wind Turbine Class rating and installation suitability.

Diurnal Wind Velocities

Diurnal wind velocities are compiled by sorting and plotting wind velocity against time of day. The graph below gives an indication of the renewable resource and any load carrying capacity that may be awarded to electrical generation so produced. Effective load carrying capacity (ELCC) may be assigned a credit representing a generator's expected (or actual) contribution to meeting the system reliability goals.

Diurnal Velocity Patten HCC-1



7. Comparison of Power Curves and Energy Capture Projections

The turbines selected for review were confined to units having 1.1MW to 1.65 MW power ratings on their nameplate. Not all units in this nameplate category were evaluated, some units were screened out due to availability issues and others because of limited operating history of the underlying technologies utilized in the manufacture of the wind turbine product line. The power curves for the selected units were used to calculate gross energy capture against collected wind data from HCC-1. These WTGS units are listed:

Manufacturer	Model/Rotor	Nameplate Rating	Hub-Height
AAER/ Fuhrländer	A-1500 77	1500 kW (1.5 MW)	80 m
AAER	A-1650 77	1500 kW (1.5 MW)	80 m
General Electric	1.5sle	1500 kW (1.5 MW)	80 m
Nordex	N60	1300 kW (1.3 MW)	85 m
Suzlon	S66	1250 kW (1.25 MW)	74 m
Vestas	V82	1650 kW (1.65 MW)	80 m

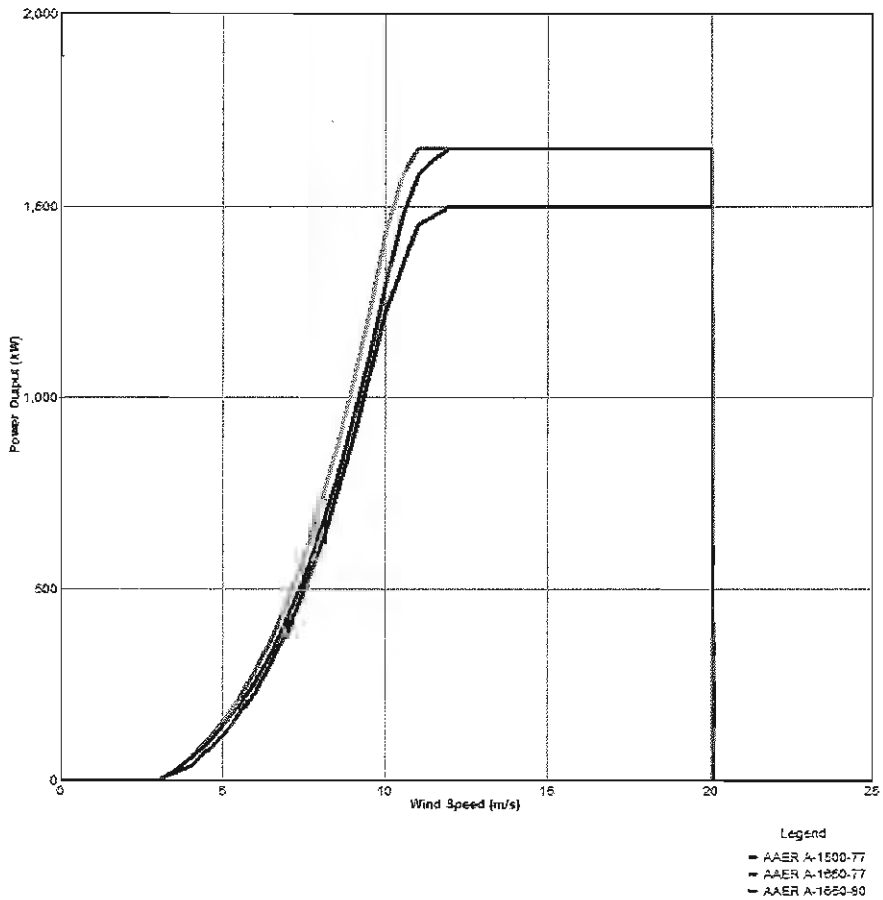
Gross energy capture was estimated for each of the units given above at an average hub-height velocity of approximately 6.70 m/s. Time increment calculations of output power, with wind shear profile recalculated for each time step, were made against the HCC-1 dataset so that reasonable comparison could be rendered. The following table holds the results for these computations.

Manufacturer	Model	Power Rating (kW)	Time at Rated Power (%)	Average Gross Power Output (kW)	Average Gross Energy Output (kW-h/yr)	Average Gross Capacity Factor (%)
AAER/Fuhrländer	A-1500 77	1500	6.10	472	4,134,516	31.5
AAER	A-1650 77	1650	6.10	516	4,515,984	31.2
General Electric	1.5sle	1500	3.83	431	3,774,248	28.7
Nordex	N60	1300	1.02	303	2,650,543	23.3
Suzlon	S66	1250	2.34	348	3,047,545	27.8
Vestas	V82	1650	3.79	513	4,495,955	31.1

Note: This table does not include energy loss that is inherent with system operation; factors contributing to operating losses e.g., blade icing, blade soiling, preventative and curative maintenance, copper loss, and structure wake from buildings and other man-made or natural features contributing to wind flow diversion (de-grading) or convergence (additive).

Power curves for the units being evaluated, had similar characteristics; however, the AAER and Fuhrländer technologies exhibited the highest percentage time of operation at rated capacity. Comparing the energy capture from the table on the previous page, three units have gross energy captures in excess of 4,000,000 kW-h/yr; namely the AAER/Furhländer units and the Vestas V82 unit. From an energy generation perspective, these units would have the best operating advantage to produce electricity, for Heartland, having the lowest unit cost of energy (UCE). The comparison of power output curves for each of the evaluated wind turbine generators is given herein.

Comparison No. 1 AAER/Fuhrländer A-1500 77 Power Curve
AAER A-1650 77 Power Curve
AAER A-1650 80 Power Curve



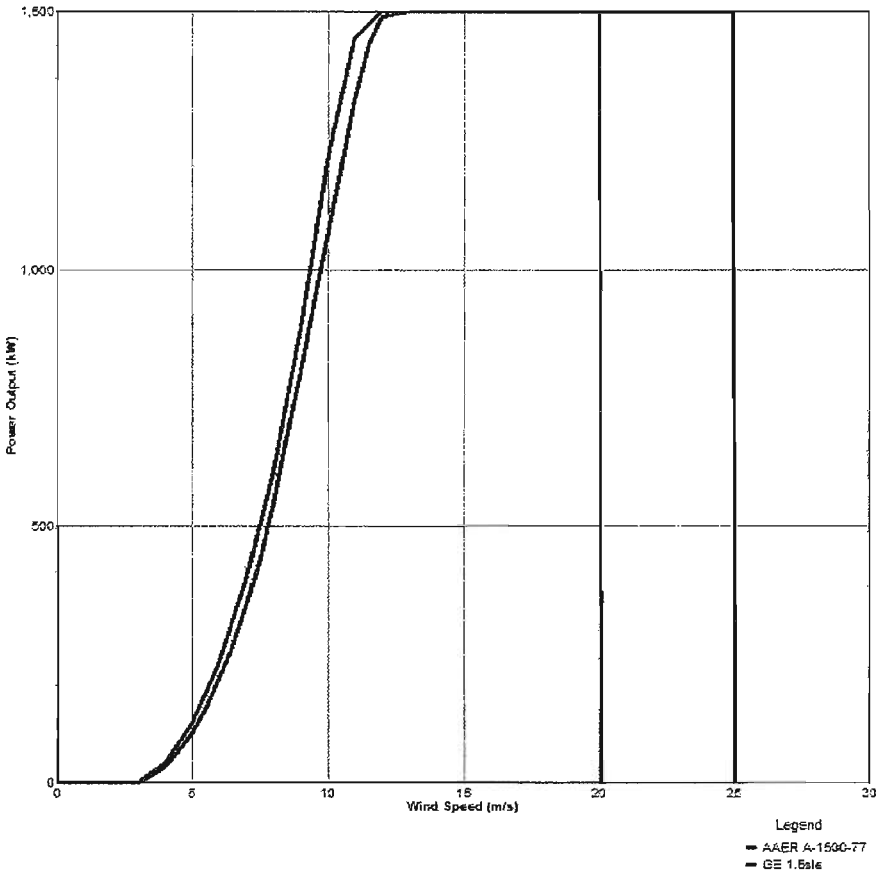
It is our understanding, and thus appropriate to inform the reader of this report, that the IPR rights for the Fuhrländer A-1500 wind turbine are held not by Fuhrländer but by Pfleiderer of Germany. Fuhrländer purchased the European manufacturing rights from Pfleiderer. Pfleiderer acquired Wind Tech, an Austrian designer of wind turbine technology as part of corporate strategy in order to gain wider exposure to the renewable energy market. Wind Tech was the original designer of PW-1500 technology. This unit is a proven

unit with many systems operating in the world energy market. The new subsidiary manufactured and installed the unit as the PW-1500. When Fuhrländer purchased the manufacturing rights it was relabeled the FL-1500. AAER has a separate agreement with Pfleiderer for manufacturing and marketing the turbine in North America as the A-1500.

Fuhrländer affiliates recently installed several larger units along the western side of the State of Michigan, specifically, two FL-2500 units. The project proponents planned on additional units; however, it is interesting to note that an apparent business decision was made to change manufacturer and model for the remainder of the project build-out. A second valuable consideration is that AAER perhaps has one of the higher North American production content rates for any wind turbine that is being sold on this continent. Shipping costs for towers and components manufactured abroad tend to increase the ICC and UCE of the project. The AAER units have been evaluated by the U.S. Navy and the U.S. Marine Corps. Recent installations in California and Rhode Island have been commissioned and continue to be functionally acceptable.

Comparison No. 2 AAER/Fuhrländer A-1500 77 Power Curve

General Electric 1.5sle Power Curve



Comparing the General Electric 1.5sle power curve against that of the AAER A-1500; the General Electric unit has a slower ramp-up in power output as a function of wind velocity. This is seen as a separation between the power output curves plotted to the graph on the previous page. The General Electric 1.5sle does operate over a higher wind velocity range; i.e., the GE 1.5sle will cut-out at 25 m/s (55.9 mph) whereas the AAER A-1500 77 will cut-out at 20 m/s (44.7 mph). This is not all that significant from an energy production perspective, relative to Heartland, because the wind regime's dataset record for HCC-1 infers that the probability distribution of wind velocities between the two cut-out values would be negligible. The following table shows the amount of time wind velocities between 21 m/s (46.9 mph) to 25 m/s (55.9 mph) occurred during the monitoring period at HCC-1.

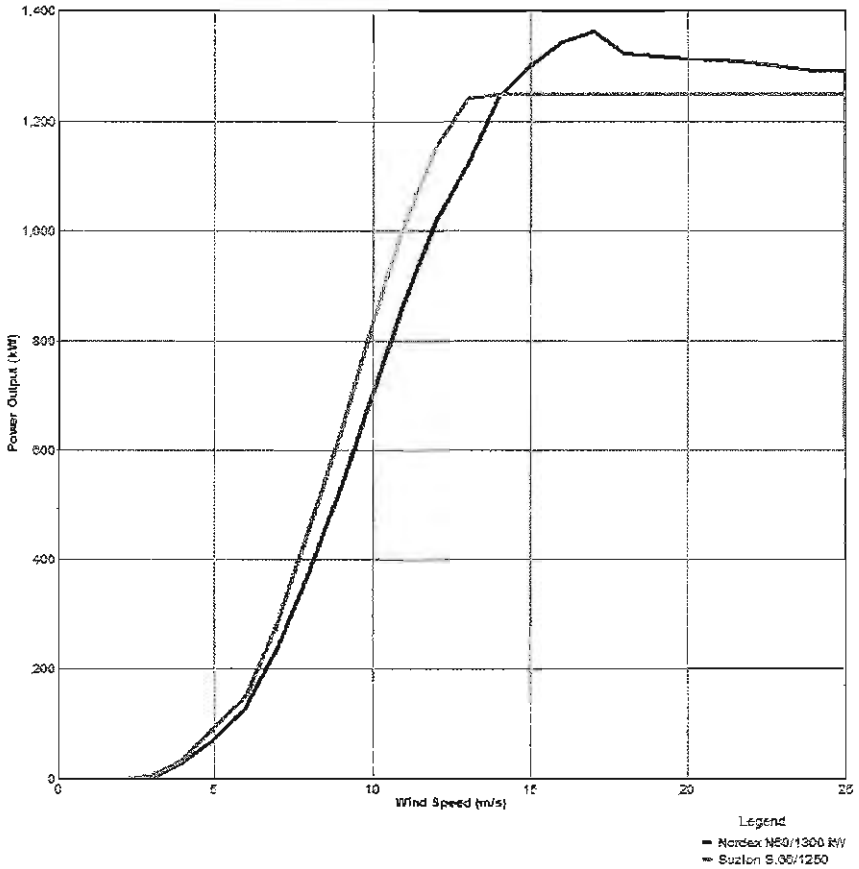
Probability Distribution of HCC-1 50m (A) Data

Bin Lower (m/s)	Bin Higher (m/s)	Frequency (%)	Hours/Yr.
0	1	1.174	102.9
1	2	3.265	319.9
2	3	6.542	573.5
3	4	11.306	991.1
4	5	14.169	1,242.1
5	6	15.146	1,327.7
6	7	13.645	1,196.1
7	8	9.896	867.5
8	9	7.420	650.4
9	10	5.905	517.6
10	11	4.223	370.2
11	12	2.752	241.2
12	13	1.775	155.6
13	14	1.187	104.1
14	15	0.754	66.1
15	16	0.452	39.6
16	17	0.229	20.1
17	18	0.072	6.3
18	19	0.028	2.5
19	20	0.020	1.8
20	21	0.015	1.3
21	22	0.009	0.8
22	23	0.009	0.8
23	24	0.002	0.2
24	25	0.002	0.2
25	26	0.000	0.0
26	27	0.004	0.4
27	28	0.000	0.0
28	29	0.000	0.0
29	30	0.000	0.0

The result in our computation is that the General Electric unit would produce 360,042 kW-h less electrical energy than the AAER A-1500 77, given identical operating conditions with the HCC-1 dataset. From this information, we would suggest that the AAER A-1500 77 would have a lower unit cost of energy and improved operating capacity factor.

Comparison No. 3 Nordex N60 1300 Power Curve

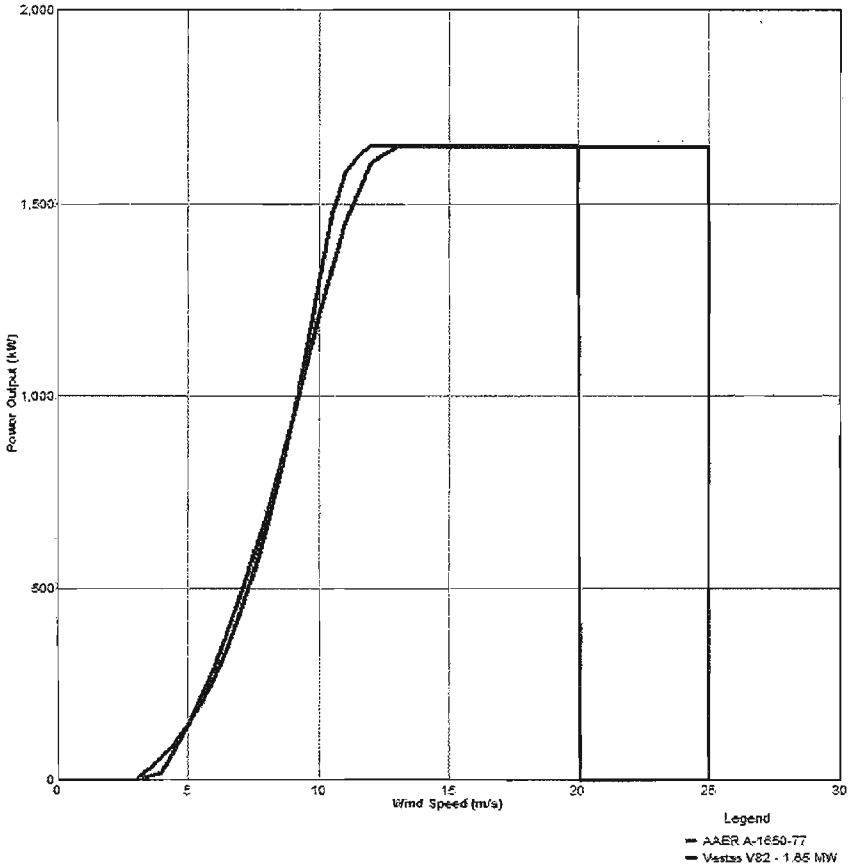
Suzlon S66 1250 Power Curve



In comparing units having nameplate power rating lower than 1500 kW (1.5MW), the Nordex N60 1,300 kW unit and the Suzlon S66 1,250 kW (1.25 MW) unit had relatively favorable energy captures for the group. The Nordex N60 has better power output ramp v. velocity after cut-in at 3 m/s (6.7 mph); however, the Suzlon S66 derives added benefit from wind velocities that occur between 14 m/s (31.3 mph) and 20 m/s (44.7 mph). The Suzlon S66 would provide better energy capture when compared to the Nordex N60 for the HCC-1 dataset.

Comparison No. 4 AAER A-1650 77 Power Curve

Vestas V82 1.65 Power Curve



Looking at units in the next incremental power class, the Vestas V82 1.65 MW wind turbine and the AAER A-1650 77 wind turbine were found to yield almost identical energy captures. Both units would make good selections in this nameplate power rating category. Should AAER's manufacturing and load engineers feel comfortable with warranting the unit with the 80m rotor option, then the added energy capture would be gain for the benefit of Heartland is difficult to ignore.

Our evaluation of the two units suggests that the AAER A-1650 77 would likely produce 4,515,984 kW-h of energy. That figure compares to 4,495,955 kW-h for the Vestas V82 1.65 MW unit, yielding capacity factors of 31.5% and 31.1% and net output ratings of 516 kW and 513 kW, respectively; less infrastructure losses.

It is our understanding that the Vestas V82 1.65 MW unit has revised the engineering specification on the gearbox due to past difficulties in the field. This will need verification from Vestas should the unit be considered for installation.

Energy Capture Projections

Computations under Group I (Optimistic) are based upon the velocity projections theoretically derived from data and should be given appropriate weight when factoring project risk. The values provided under Group II (Realistic) reflect a conservative estimation of projected energy generation for the contemplated project, based on risks relating to the unpredictability of wind velocity due to weather pattern direction and other factors which will influence and add to the unpredictability of wind velocity in general. The values provided under Group III (Pessimistic) reflect a more conservative estimate and AESI would recommend that prudent financial planning and project risk analysis, undertaken by the Heartland Management and Board of Trustees, use the values provided in Group III as the lower measure of energy capture for any pro forma calculations and business modeling.

Probability Levels for Energy Production AAER A1500-77 (80m) (1)(2)(3)

	P_{50}	P_{75}	P_{90}	P_{95}	P_{99}
Group I – Optimistic					
Velocity	6.79	6.67	6.57	6.56	6.51
MW-h (gross)	4,415	4,267	4,142	4,129	4,066
Capacity Factor (gross)	0.335	0.325	0.315	0.314	0.309
Group II – Realistic					
Velocity	6.70	6.58	6.49	6.47	6.42
MW-h (gross)	4,305	4,154	4,041	4,016	3,953
Capacity Factor (gross)	0.327	0.315	0.307	0.305	0.300
Group III – Pessimistic					
Velocity	6.36	6.25	6.16	6.15	6.10
MW-h (gross)	3,877	3,737	3,621	3,608	3,544
Capacity Factor (gross)	0.294	0.284	0.275	0.274	0.269

NOTES TO PROBABILITY TABLE

Note (1): Velocities derived from metered and historical values believed to be accurate. Energy capture is based on manufacturer power curves assuming a standard Weibull shape parameter, k = 2.000.

Note (2): It is important to recognize that the 50m Weibull parameter k = 2.225 for HCC-1 data collected and, thus, will yield energy captures which are lower than those represented in the table above. Insufficient HCC-1 data history exists to adjust energy capture for Weibull k parameter at this time.

Note (3): The k parameter describes the shape of the wind distributiou and will change from year to year (see plot for Probability Distribution Function, p. 24)

8. Estimated Development Cost and Load Demand

The wind turbine industry is currently in a state of change, being affected by the recent downturn in the national economy and further complicated with a lack of liquidity in the financial lending markets. Large developers and manufacturers will likely find themselves with projects that are no longer finance-able; leaving only the strongest project proponents to see project development through to completion. Construction companies, manufacturers and heavy equipment vendors will come under pricing pressure as equipment demand contracts. Estimates for installed projects with 80 m towers fall into two ranges: fully engineered, $2,100/kW to $2,200/kW; and EPC project bids, $2,200/kW to $2,540/kW. We believe $2,138/kW is a reasonable estimate based on pricing information available to AESI for project bids during the Fall of 2010 that have been fully engineered.

Other factors which will influence the availability of wind turbines and balance of plant resources include, cost of fuel and transportation, liquidity in the credit markets, stability of the U.S. dollar, and international, federal, state and local regulation on carbon emission legislation now pending in the U.S. Congress.

The following rough calculations, for a single 1500 kW wind turbine generator, at 80 m, are made for the purpose of discussion and do not include the cost of maintenance:

- Estimated Initial Capital Cost (ICC) — $3,206,638
- P_{75} wind velocities — 6.25 m/s (P75 Pessimistic) to 6.67 m/s (P75 Optimistic)
- Annual energy capture w/Weibull k=2.0 — 3,737,000 kW-h to 4,267,000 kW-h
- Life-cycle net energy capture (25 yrs.) — 93,425,000 kW-h to 106,675,000 kW-h
- Adjust for losses and Weibull k — 79,411,250 kw-h to 90,673,750
- Un-levered unit cost of energy (UCE) — $0.04036/kW-h to $ 0.04538/kW-h

The assumptions and estimates in this section of the report are based on 100% cash and grant financing and include operation and maintenance at $0.005/kW-h; maintenance can average $0.004/kW-h to $0.0091/kW-h depending on items relevant to the warranty service maintenance agreements and turbine supply agreements negotiated with the manufacturer.

The sale of green attributes will further enhance the financial pro forma for the proposed project. The state of Illinois recently enacted a Renewable Portfolio Standard (RPS) mandating state utilities to offset carbon emissions. Each MW-h of electrical generation produce by a wind turbine generator will also produce a fungible Renewable Energy Certificate (REC) which may be sold to a utility for purpose of complying with the

state RPS. The sale of Renewable Energy Certificates (RECs) is currently estimated at $0.005/kW-h to $0.010/kW-h.

The U.S. Congress and the White House will most likely provide enhanced financial incentives for the development of renewable energy projects in an effort to stimulate economic activity and employment with energy and general infrastructure development and maintenance programs. The incentives may encompass low interest guaranteed loans, interest free clean renewable energy bonds, and accelerated depreciation of capital equipment under the Modified Asset Cost Recovery Schedule (MACRS). Heartland may find it advantageous to form a Public Private Partnership for the purpose of attractive project equity financing the proposed development.

COST ESTIMATE FOR HEARTLAND CAMPUS WTGS INSTALLATION

	L1 Power Option and Underground Collector w/80m Turbine 1500-77	L2 Power Option (Not Applicable)	L3 Power Option (Not Applicable)	L4 Power Option (Not Applicable)
Turbine and Tower [1]				
AAER/FL A-1500-77 (80m)	2,250,000			
Transportation	120,000			
FAA Navigation Beacons	10,000			
Total Turbine and Tower	2,380,000			
Structural				
75m Foundation and Rebar				
80m Foundation and Rebar	130,000			
100m Foundation and Rebar				
Civil				
Site Work	17,400			
Access Roadways	20,000			
Horizontal Drilling				
Electrical				
Concrete	6,000			
Wiring Methods	55,303			
Raceway & Boxes	27,000			
Electrical Power	36,000			
Crane [2]				
Rental Primary Crane	115,000			
Rental Auxiliary Crane	30,000			
Transportation (Mob/Demob) [3]	25,000			
Labor	35,000			
Erection of Tower and Setting Turbine [4]				
Labor	15,000			
Contractor Misc. [5]	13,000			
Contingencies (7%)	35,819			
Project Developer/Manager (3%) [6]	84,616			
Design Engineering	75,000			
Geotechnical	15,000			
Avian/EIS	70,000			
Micro-Siting	21,500			
Total	$3,206,638			
Cost/kW	$2,138			

NOTES TO COST ESTIMATE TABLE

Note (1): Turbine cost was calculated in US Dollars after conversion from Euro Dollars and Canadian Dollars as required. Currency conversion factors used: 1 USD = 1.54 Euro; 1 USD = 1.02 CAD .

Note (2): Crane rental fees based on 14 day commitment. Prices vary widely based on region, size and advance reservations.

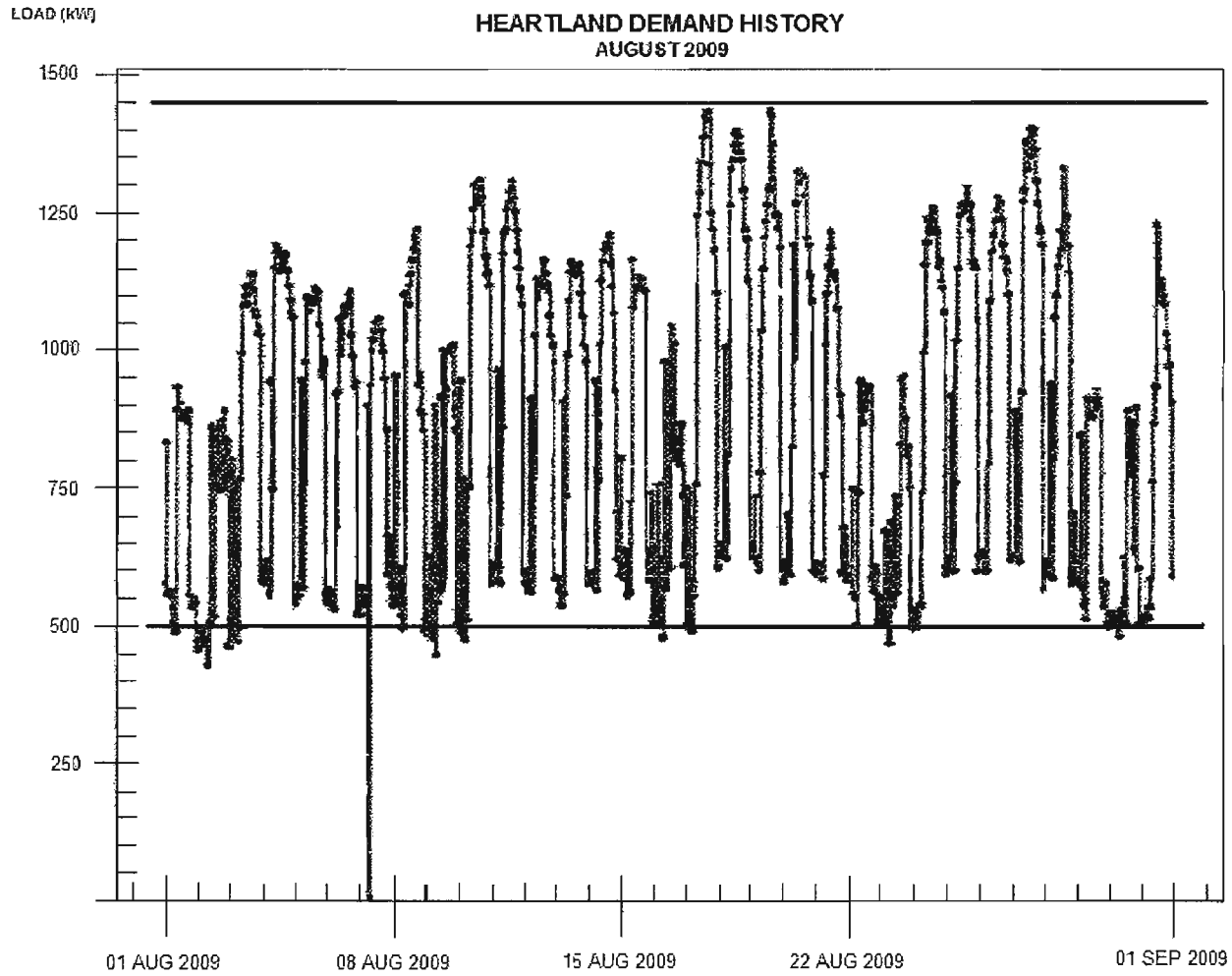
Note (3): Crane Mob, Demob, Rental and labor is based on one turbine installation with rental for one month.

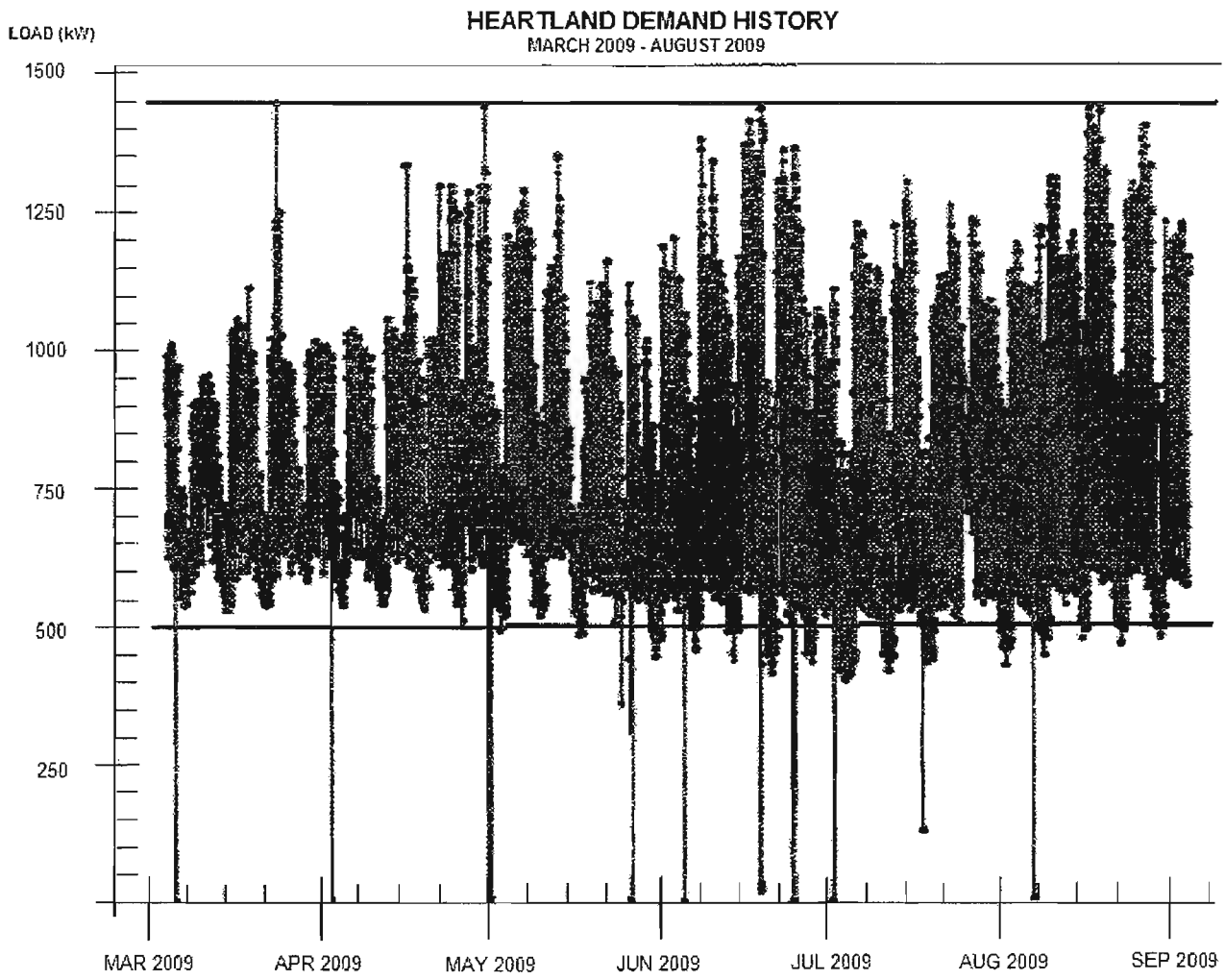
Note (4): Erection Labor is per turbine installation

Note (5): Contractor miscellaneous fees provide a margin for minor equipment rental, scaffolding and spent supplies.

Note (6): Project Developer/Manager fee based on 3% of total cost of project less Design Engineering cost.

The installation of a 1.5MW wind turbine generator is anticipated to offset approximately 500kW of electrical load; the current electrical load for Heartland Community College averages 815 kW with an estimated daily swing between 1,250 kW to 510 kW, e.g., graphics load timelines given below for August 2009 and for the period March 2009 thru August 2009. The reader of this Report should note that these demand graphs do not represent electrical demand that is expected going forward into 2010 and beyond; due to the additional buildings and facilities that have been constructed on the campus and, as of yet, have not been connected to the electrical infrastructure. We suspect, based on the limited information we have on building loads, that Heartland could easily experience an increase of 15% to 20% in energy demand.





Datasets with actual load demand timestamps were not provided to AESI, for the purpose of comparing the number of times a 1.5MW wind turbine would have provided more power output than would have been required by campus load. Therefore, from our perspective, it is probable this condition would have occurred on more than one occasion. From our estimation of power flow, we believe that a 1.5MW to 1.65MW wind turbine generator would be the most appropriate nameplate unit for renewable energy generation at Heartland Community College's Normal Campus. With the additional demand, the probability of exporting power will lessen, the degree of which is currently undetermined.

Heartland will need to decide how the institution wishes to handle the negotiation of power out-flow into the local distribution grid. This decision should be rendered upon discussions with the electric provider and the exact point of coupling (interconnection) of the wind turbine generator to the electrical system. We believe that there may be justification for the wiring of the secondary wind turbine generation into the electrical switchgear of the college. This will depend on a number of technical and code factors as the project moves forward.

In our opinion, Heartland should not need their electric supplier to firm or back-up generation from the wind turbine under a special contractual agreement; however, careful consideration should be given to how Heartland handles these negotiations for any surplus power off-take and the matter of forward sales of Renewable Energy Certificates (RECs) generated by the proposed project.

Depending on how negotiations with the electric supplier and or distributor are handled, the facility could simply operate as load offset generator depending or a parallel generating facility conditioned on whether the interconnection is made before or after the first division of main. The registration of the facility as a Qualified Facility (QF) under Federal Energy Regulatory Commission (FREC) or Illinois Commerce Commission (ICC) rules, a MISO QF or Local Utility QF, respectively, should be carefully evaluated.

Under State of Illinois Law, Heartland may have the right to establish a Retail Electrical Supplier status; for the purpose of selling electrical energy back to itself or to another designated party thought the Midwest Independent System Operators' (MISO) transmission grid network. The generating facility could be located on-site or off-site.

9. Closing Comments

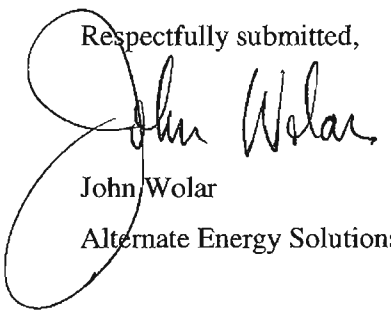
Alternate Energy Solutions, Inc. was engaged by the administration of Heartland Community to study the wind regimes at the Normal, Il campus. We believe that the proposed wind turbine development project will provide valuable electrical energy offset for the college and an effective energy cost hedge against the likely occurrence of inflation in the energy markets. Our evaluation is based on the data which has been gathered from the HCC-1 Meteorological Tower, local and regional short- and long-term monitoring stations.

We are recommending that Heartland Community College pursue discussions with AAER, of Bromont, Quebec (Canada), for a cost quotation on the AAER A-1500/1650 wind turbine. We also suggest that Heartland not limit the discussion to AAER, due to the fact that the VESTAS V82 provides essentially the same performance outcomes. Heartland should be aware that VESTAS may not entertain discussions for a single wind turbine, as the company has traditionally engaged projects that are 30MW or larger. However, in light of the current economic conditions and multiple wind generation projects being postponed in North America, companies may be more willing to consider smaller equipment orders.

We believe that is would not be pragmatic to use multiple lower nameplate generating units because of turbine array and structural interference losses on the limited campus area.

We are very grateful to Heartland Community College for selecting our company for this study and look forward to assisting with this project as deemed appropriate by you.

Respectfully submitted,



John Wolar

Alternate Energy Solutions, Inc.

APPENDIX A:

Selected Wind Turbine Manufacturer and General Specifications – AAER A1500-77

APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-3: Shadow Flicker and Noise Report

WES Engineering Inc.

706 S. Orchard St, Madison, WI 53715, Ph#608-259-9304 WWW.WESENGINEERING.COM

Heartland College Wind Turbine– Shadow Flicker and Noise Report, New Location

(100kW turbine recently installed in Illinois, WES Engineering acted as Wind Engineer on this project)

Sep 28, 2010
WES Engineering Inc.
706 S. Orchard St
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608-259-9304 ph
608-299-0426 fax
Wes Slaymaker, P.E.
President

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 Heartland College. 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. The Heartland project has not selected a turbine so Consultant cannot calculate wind speed frequency related operating hours, as each turbine has a different cut- in speed. The directional distribution is represented by the wind rose determined from the project met tower data, shown on next page, and is predominantly Southerly winds and next is Northwest. This means the impacted building will receive the most shadow flicker potential from Northwest winds, and those occur the most in winter months. Detailed calculations can be made to be more exact on reduced shadow flicker hours if actual site wind and cloud cover data is used.

Shadow Flicker Modeling

Below in Figure 1 is the modeled shadow flicker from a turbine that has 82m rotor and 80m tower (the current proposed Heartland 1.5MW turbine). The maximum theoretical shadow flicker at the nearest college building is 102 hours per year, and likely below 50 actual hours per year after reductions for clouds, low winds and rotor orientation. The shadow impact is in May, June and July with the greatest time of 70 minutes per day from 5:30 pm to 6:40 pm. A second building receives 8 maximum hours per year, and likely less than 4 real hours per year. There are no other residences or buildings that would receive shadow flicker. A separate detailed report of hours of impact is attached as Appendix A, and gives the date and time of shadow flicker at the buildings closest to the turbine.

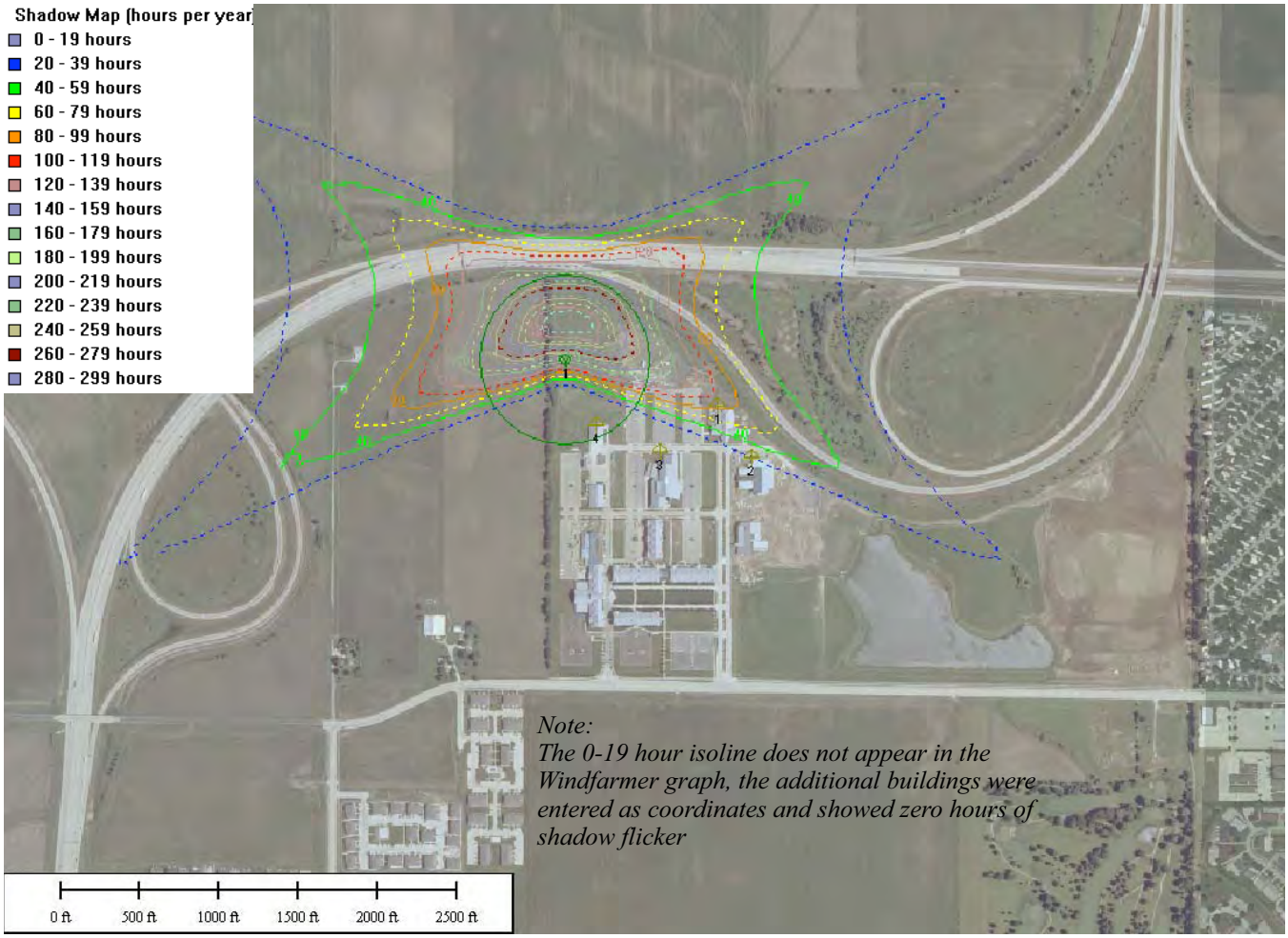


Figure 1- Shadow Flicker Map: Overview

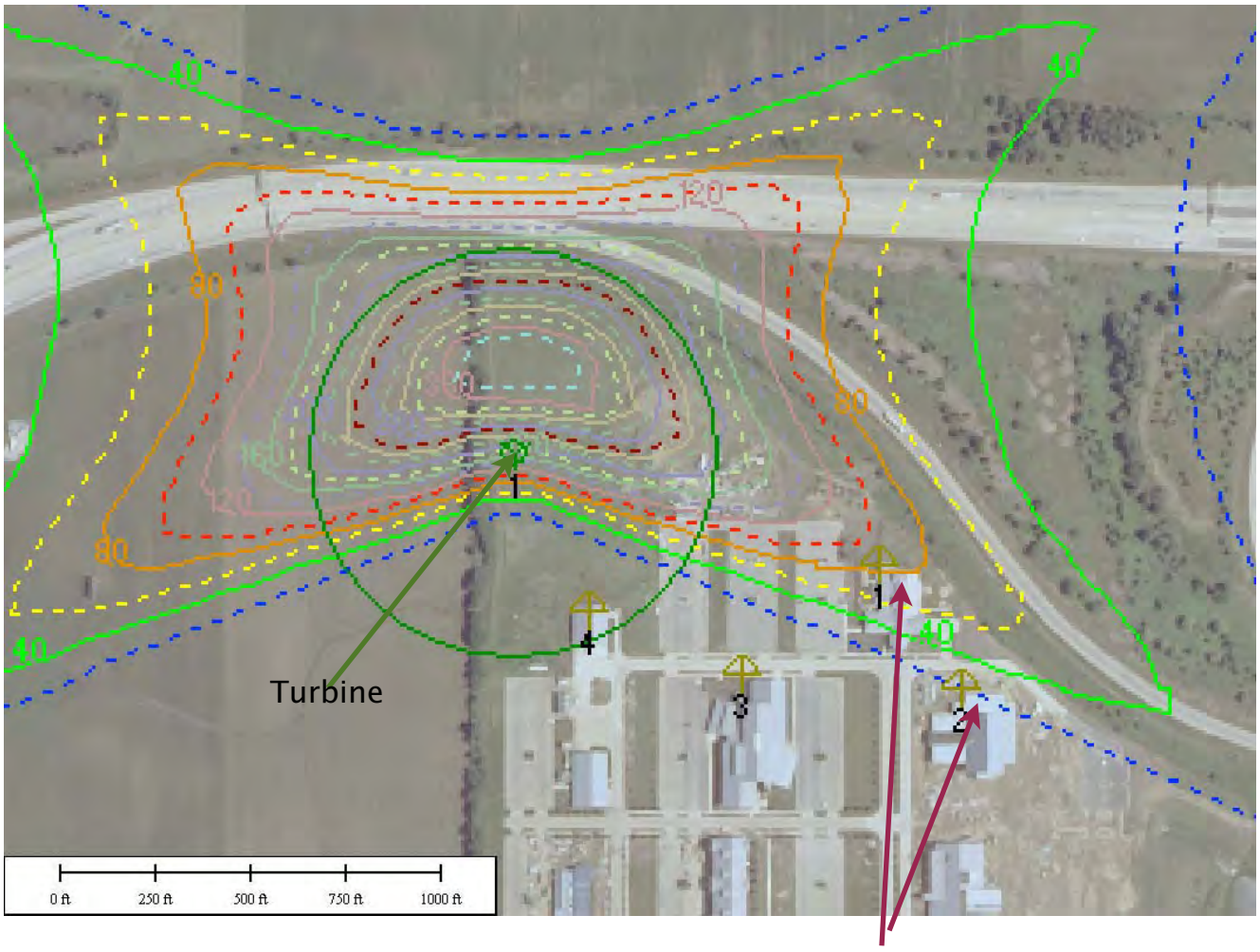


Figure 2- Shadow Flicker Map: Close-up

Shadow over Roadway

The shadow flicker area does cross the Interstate and there will be some areas of the roadway and exit with greater than 100 hours of shadow flicker in one year. The effects of shadow flicker on drivers has not been documented in scientific reports. The observed effects are that the drivers speed minimizes any effects as the speed of travel and direction of travel either accelerate the time under the shadow or decrease the time and make the shadow seem as if it is traveling with the vehicle. There are numerous operating wind turbines within 400' of Interstate highways operating for more than 5 years with no known complaints, including Valley City, ND near I94, near I-435 in Kansas, I-80 in Iowa and the new two turbines along I-88 near Geneseo, IL.

Noise Modeling

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. “

For the nearby residential areas the noise modeling was done near the “property edge” for the multifamily units and the trailer park, and near the residence edge at the one older farm house. Previous studies and analysis all model and predict at the receptor, even if sound measurement is made at the property edge.

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
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 2- Illinois PCB allowable night 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
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)

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 contains tables of land class, and an "alternative energy source" function code 4314 is a land class C[1].

There are also limits to any "tonal" conditions, which is defined as sound spectra in which any 1/3 linear octave band sound pressure level exceeds the arithmetic average of the two adjacent 1/3 octave bands by the following amounts:

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

The wind turbine does not have any tonal conditions per this definition as can be seen in Table 4 (next page) Octave Band Spectra from the wind turbine manufacturer, as measured at turbine, but at large distances from turbine this condition may apply for the 2000 Hz and above frequency bins if there is no background noise increasing the dB noise level in the higher frequencies. At this site the traffic noise will likely prevent this tonal penalty if measurements are taken after the turbine is operating.

Below is the excerpt from the turbine supplier in regards tonality:

At the reference measuring point R_o, a ground distance from the turbine base equal to hub height plus half the rotor diameter, the GE 1.5xle turbine has a value for tonality of $\Delta L_a \leq 4$ dB, irrespective of wind speed, hub height, and grid frequency.[3]

[1] Title 35 Environmental Protection, Subtitle H: Noise Chapter I: Pollution Control Board Part 901 Sound Emission Standards and Limitations for Property Line-Noise-Sources
[3] as defined according to IEC 61400-11: 2002

5 Octave Band Spectra

Following is a table with the octave band values at nominal turbine operation, typically corresponding to wind speeds larger than 10 m/s at 10-meter height.
Octave band spectra as a function of smaller wind speed at 10-meter height depend on hub height and surface roughness. Indicative octave band values can be derived using the table below thereby multiplying the tabled values below with the L_{WA} level for a given wind speed at 10-meter height (section 2) and dividing this by 104 dB(A):

$$\text{Octave Band value } (V_{i,10\text{-m}}) = \text{Octave Band value (nominal operation)} \cdot L_{WA}(V_{i,10\text{-m}}) / 104 \text{ dB(A)}.$$

Note: The octave band spectra are informative only.

Octave [Hz]	Sound power level [dB]
63	83.4
125	92.2
250	97.8
500	99.4
1000	97.7
2000	93.4
4000	86.6
8000	84.8
Sum	**104.0**

Table 4- Octave Band Output of Sample 1.5MW Wind Turbine- GE xle

Summary of Acoustic Criteria

The criteria used to evaluate the wind turbine impact at nearby "receptors" is the following:

- EPA 55dBA L_{dn} (24) outdoors at all residential receptors. Assuming wind turbine is operating at steady state sound level at the receiver location the L_{dn} is approximately 6.4 dB above the measured L_{eq}, so an L_{dn} of 55 dBA corresponds to maximum L_{eq} of 48.6 dBA.
- IL PCB nighttime octave frequency band dBL limits for Class A land from Class B land- see Table 2.
- OSHA limits per 29 CFR 1926.101 where long term exposure limits of 8 hours or more for hearing protection must be below 90 dBA.

Background Noise and Noise Measurement

The existing noise environment for the wind turbine location in this area is characterized by heavy interstate highway traffic, intermittent car traffic on campus, and other campus activities that includes students talking, maintenance staff doing repairs or grounds work, and an outdoor daycare center. The site is bounded to the north and West by a four lane divided I-55/74. To the south lies the Heartland College campus and Raab Rd. The nearest residential area is located over 2,000 feet away from the proposed wind turbine location, and the next closest residential area to the East is over 3,500 feet from the turbine.

The sound readings were recorded between approximately 8 a.m. and 9 a.m. WES used a Larson Davis Model 831 Sound Level Meter with a windscreen over the end of the microphone. The unit was set for an A-weighted measurement (dBA).

Below in Table 3 are the sound pressure values from a variety of sources in the environment.

TYPICAL SOUND PRESSURE LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

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

Adapted from Table E, "Assessing and Mitigating Noise Impacts", NY DEC, February 2001.

Table 3. Typical Sound Pressure Levels Measured in the Environment and Industry.

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. At a distance of approximately 350 meters (approximately 1,150 feet), sound from the wind turbine is in the range of 45 dBA (Table 3, cited in Colby et al. (2009)).

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. However, modern wind turbines are generally quiet in operation and this sound is anticipated to be less noticeable by humans when compared to sound from road traffic, and campus activities for this Heartland College site.

Noise would be temporarily emitted from the project site by construction equipment during the approximately five-month active construction period. However, due to the noise-generating activities from the existing highway, college traffic, etc., as described above, the wind turbine project construction noise would not be expected to significantly increase the overall ambient noise emissions from the site on a L_{dn} (24) measurement, as there are few periods of significant activity during that lengthy period. For example the foundation excavation occurs in two days (noisy), but then there are many days with little additional noise when foundation rebar is tied, and after the concrete is poured it must cure for 30 days. There are approximately 20 days of significant construction activity during this period, times when large equipment such as bulldozer or cranes are being operated and generating a lot of additional noise.

Acoustic Modeling Methodology:

The Noise modeling was done with the Windfarmer noise modeling software module. Whereas specific sound level data was not available for the AAER A-1500 turbine that Heartland is evaluating[1], sound level data was available for a similar 1.5MW turbine (the GE 1.5 xle) with the same hub height (80 m), and almost identical rotor diameter (80.5 m vs. 80 m). The guaranteed sound power level supplied by the turbine manufacturer of 104dBA at the nacelle was utilized. Windfarmer allowed this maximum sound power level to be entered by octave band, see below Table 4 for the octave band values. The turbine noise levels are GL certified and the actual values are below the guaranteed sound power level and so reflect the conservative maximum noise estimate.

Below in Figure 3 is the modeled noise for the Heartland 1.5MW turbine on an 80 m tower. The modeling shows the maximum noise level from the turbine using the sound power level provided by GE of 104 dBA at the nacelle (this is similar to the maximum sound power level identified by other

manufacturers[1] - Acciona, Vensys). The turbine will normally operate below this level. This noise level maximum is reached when wind speeds are above 8 m/s (18 mph), 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 building to the proposed wind turbine location (the Receiving and Storage Building) is modeled at 51.8 dBA maximum. There are several other buildings close to the turbine (Physical Plant Building, Workforce Development Center, Child Development Lab) with maximum sound levels between 47.37 and 45.48 dBA. The building with outdoor daycare (Child Development Center) has modeled sound maximum of 45.48 dBA. The background sound level at most of these buildings during the day would be expected to be similar or higher than the maximum level from the turbine due to on campus traffic, heating and ventilating systems, and the thousands of students, faculty and staff moving throughout the campus on a daily basis, and poses no health risk to the occupants of these buildings. There were two residential areas nearby. The residential area approximately 1,800-2,000 feet Southwest had maximum noise levels ranging from 39.54 to 37.63 dBA, and the residential area due east (residential trailer park setting) had maximum sound level ranges of 31.7 to 30.5 dBA. All other residences are further away and well below the EPA 55 DNL to 65 DNL range at residences, or ILPCB octave band limits. Table 5 below contains the octave band frequency estimates for the nearest residential area as compared to the modeled noise output from the turbine). The 1,000 Hz band has the closest values to the limit.

[1] Limited manufacturer noise level data was available for the AAER A-1650, a model similar to the AAER A-1500. While octave band level data was not available, the maximum guaranteed sound power level at hub height was listed as 103 dB. To ensure conservative results, the GE 1.5 xle was selected for modeling purposes due to its similar size, availability of octave band data, and slightly louder sound power level of 104 dB.

Octave Band Frequency Analysis

Octave Hz	Sound power level NRO 104-Rev.3 [dB]	Sound power level NRO 103-Rev.3 [dB]	Sound power level NRO 102-Rev.3 [dB]	Sound power level NRO 101-Rev.3 [dB]	Sound power level NRO 100-Rev.3 [dB]
63	83.4	82.6	81.7	80.8	80.0
125	92.2	91.3	90.3	89.3	88.4
250	97.8	96.8	95.7	94.7	93.8
500	99.4	98.4	97.3	96.3	95.3
1000	97.7	96.7	95.7	94.7	93.7
2000	93.4	92.5	91.5	90.5	89.6
4000	86.6	85.7	84.8	83.9	83.1
8000	84.8	84.0	83.1	82.2	81.4
Sum	104.0	103.0	102.0	101.0	100.0

Table 4b- GE xle turbine octave band values with noise reduction option (NRO)

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.

Below in Table 5 the GE turbine octave bands are used in the above formula and the equivalent dBA is 102 dBA (some error in the calculation or in the provided octave bands, reduces it from 104dBA)

Freq	GE turbine	scale correction	corrected	divide by ten
31.5	80	-39	41	4.1
63	83.4	-26	57.4	5.74
125	92.2	-16	76.2	7.62
250	97.8	-9	88.8	8.88
500	99.4	-3	96.4	9.64
1000	97.7	0	97.7	9.77
2000	93.4	1	94.4	9.44
4000	86.6	1	87.6	8.76
8000	84.8	-1	83.8	8.38
	La=	101.6506538998	dBA	
Table 5- GE	**Sound Power Level at generator**			

Freq	GE turbine at base	scale correction	corrected	divide by ten
31.5	40	-39	1	0.1
63	43.4	-26	17.4	1.74
125	52.2	-16	36.2	3.62
250	57.8	-9	48.8	4.88
500	59.4	-3	56.4	5.64
1000	57.7	0	57.7	5.77
2000	53.4	1	54.4	5.44
4000	46.6	1	47.6	4.76
8000	44.8	-1	43.8	4.38
	La=	61.65	dBA	
Table 6- GE	**Sound Power Level at ground level**			
Freq	1870 feet	scale correction	corrected	divide by ten
31.5	17.8	-39	-21.2	-2.12
63	21.2	-26	-4.8	-0.48
125	30	-16	14	1.4
250	35.6	-9	26.6	2.66
500	37.2	-3	34.2	3.42
1000	35.5	0	35.5	3.55
2000	31.2	1	32.2	3.22
4000	24.4	1	25.4	2.54
8000	22.6	-1	21.6	2.16
Table 7-	**Sound Power Level at nearest residence**			

Below in Table 8 are the octave band limits set by the IL PCB and the octave band frequencies modeled at the nearest residential structure Southwest of the campus on Raab Rd.

	Class C	at 1870 feet
Freq	IL PCB night limit dB	Turbine dB
31.5	69	55.5
63	67	45.9
125	62	44.7
250	54	43.3
500	47	38.9
1000	41	34.2
2000	36	28.9
4000	32	22.1
8000	32	22.3

Table 8- Octave band frequency of turbine at nearest residences versus IL PCB limits

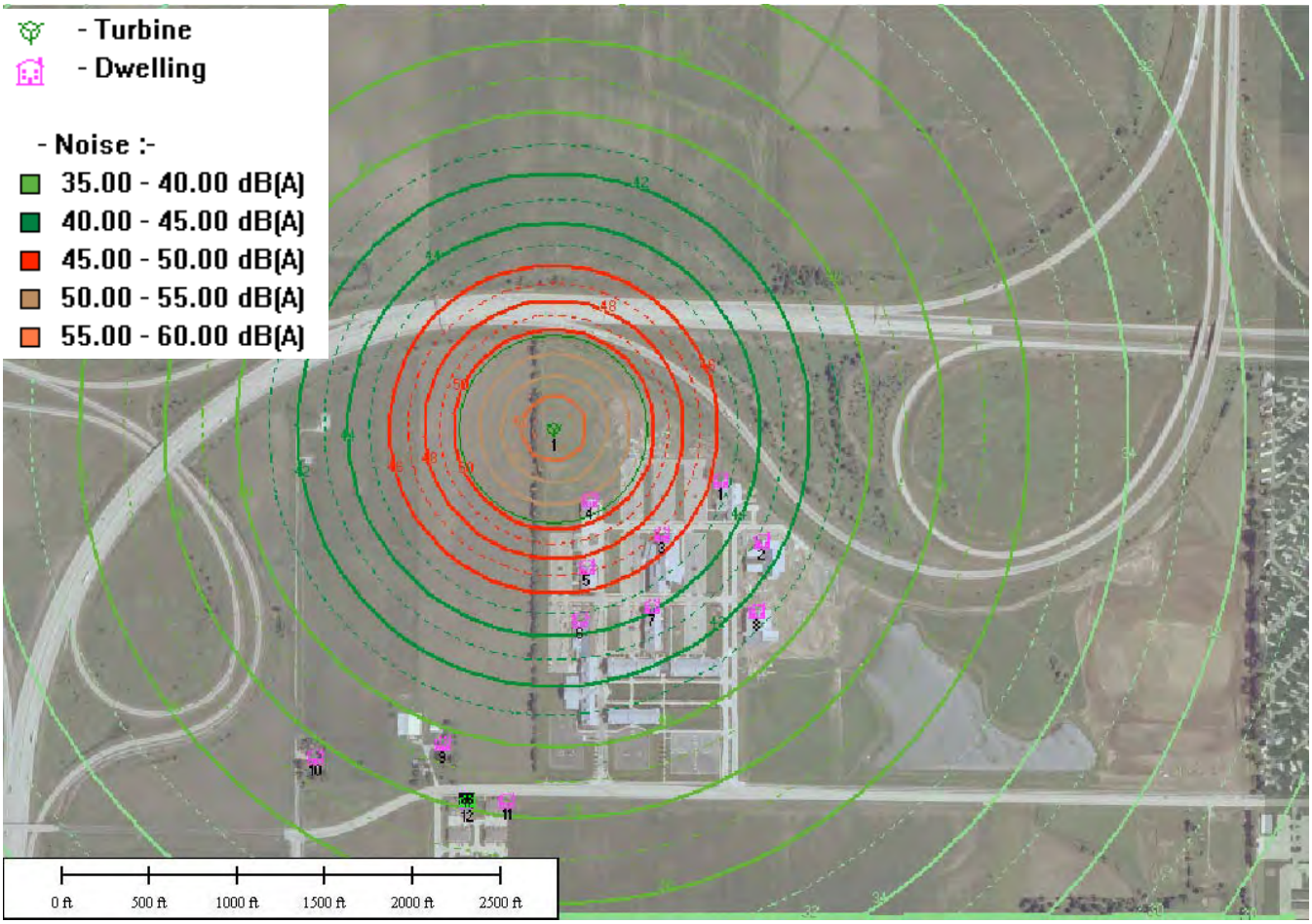


Figure 3- Heartland project noise modeling in dBA: Overview

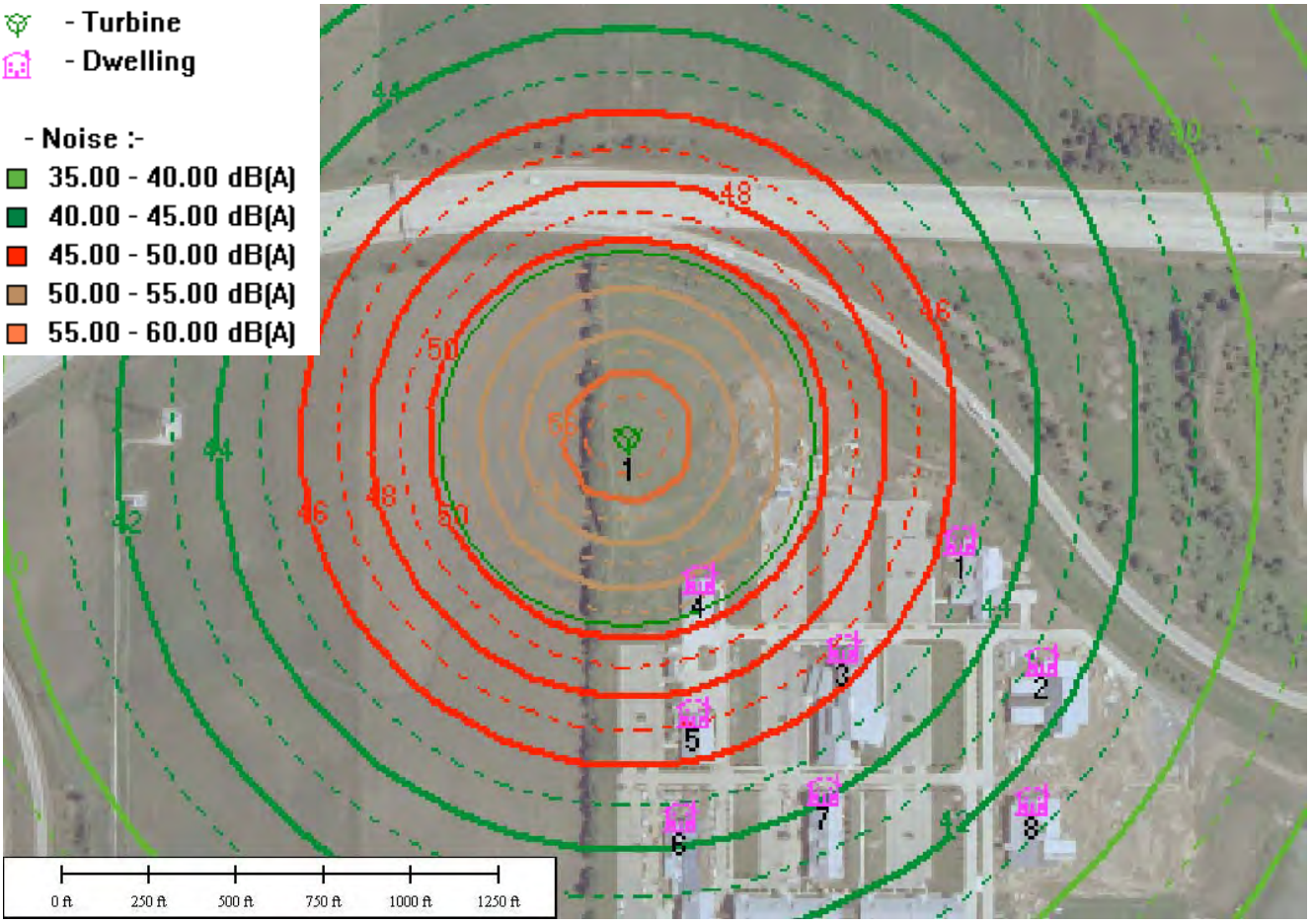


Figure 4- Heartland project noise modeling in dBA: Closeup

Appendix A

GH WindFarmer Report
Heartland College Windfarmer shadow flicker and Noise data
28 Sep 2010

1 Project: Heartland - Dwellings noise

Dwelling ID	Noise prediction (dB(A))	Noise limit type	Absolute noise limit (dB(A))	Relative to background noise limit (dB(A))
1	45.48	Absolute	45.00	Not applicable
2	42.83	Absolute	45.00	Not applicable
3	46.83	Absolute	45.00	Not applicable
4	51.80	Absolute	45.00	Not applicable
5	47.37	Absolute	45.00	Not applicable
6	44.73	Absolute	45.00	Not applicable
7	44.22	Absolute	45.00	Not applicable
8	41.47	Absolute	45.00	Not applicable
9	39.54	Absolute	45.00	Not applicable
10	37.62	Absolute	45.00	Not applicable
11	38.41	Absolute	45.00	Not applicable
12	38.20	Absolute	45.00	Not applicable

Table 1 - Project: Heartland - Dwellings noise

2 Shadow Flicker Data

WindFarmer Site Shadow Flicker Report 4.1.1.0
File name:Heartland Windfarmer shadow terrain Sep 28 2010 C:\Documents and Settings\WES\My Documents\WES Engineering\Projects\Illinois\WIU Prospects\Heartland\Heartland Windfarmer shadow terrain Sep 28 2010.wow
Date: September 28, 2010

Latitude	40 deg 32 min	North
Longitude	89 deg 1 min	East
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	Turbine visibility considered	
Visibility line of sight algorithm checks every	10.0	m

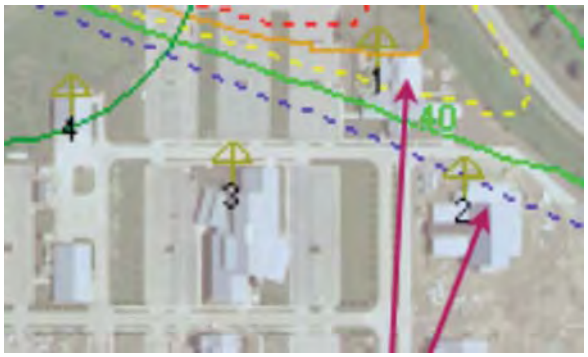
3 Project: Heartland

Number of shadow receptors: 4

Receptor ID:1 (Refer to Figure 2 in report for map of receptors)

Height: 2m
Easting: 329517m
Northing: 4489275m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	<label>	Hours per year	102
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 141	70	17:30	18:40
29/04 119	10	18:00	18:10
30/04 120	10	18:00	18:10
01/05 121	30	17:50	18:20
02/05 122	30	17:50	18:20
03/05 123	30	17:50	18:20
04/05 124	40	17:40	18:20
05/05 125	50	17:40	18:30
06/05 126	50	17:40	18:30
07/05 127	50	17:40	18:30
08/05 128	50	17:40	18:30
09/05 129	50	17:40	18:30
10/05 130	50	17:40	18:30
11/05 131	50	17:40	18:30
12/05 132	50	17:40	18:30
13/05 133	50	17:40	18:30
14/05 134	60	17:30	18:30
15/05 135	60	17:30	18:30
16/05 136	60	17:30	18:30
17/05 137	60	17:30	18:30
18/05 138	60	17:30	18:30
19/05 139	60	17:30	18:30
20/05 140	60	17:30	18:30
21/05 141	70	17:30	18:40
22/05 142	70	17:30	18:40
23/05 143	70	17:30	18:40
24/05 144	70	17:30	18:40
25/05 145	70	17:30	18:40
26/05 146	70	17:30	18:40
27/05 147	70	17:30	18:40
28/05 148	70	17:30	18:40
29/05 149	70	17:30	18:40



30/05 150	70	17:30	18:40
31/05 151	70	17:30	18:40
01/06 152	70	17:30	18:40
02/06 153	70	17:30	18:40
03/06 154	70	17:30	18:40
04/06 155	70	17:30	18:40
05/06 156	70	17:30	18:40
06/06 157	70	17:30	18:40
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09/06 160	60	17:40	18:40
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11/06 162	60	17:40	18:40
12/06 163	60	17:40	18:40
13/06 164	60	17:40	18:40
14/06 165	60	17:40	18:40
15/06 166	60	17:40	18:40
16/06 167	60	17:40	18:40
17/06 168	60	17:40	18:40
18/06 169	60	17:40	18:40
19/06 170	60	17:40	18:40
20/06 171	60	17:40	18:40
21/06 172	60	17:40	18:40
22/06 173	60	17:40	18:40
23/06 174	60	17:40	18:40
24/06 175	60	17:40	18:40
25/06 176	60	17:40	18:40
26/06 177	60	17:40	18:40
27/06 178	60	17:40	18:40
28/06 179	60	17:40	18:40
29/06 180	60	17:40	18:40
30/06 181	60	17:40	18:40
01/07 182	60	17:40	18:40
02/07 183	60	17:40	18:40
03/07 184	60	17:40	18:40

04/07 185	60	17:40	18:40
05/07 186	60	17:40	18:40
06/07 187	60	17:40	18:40
07/07 188	60	17:40	18:40
08/07 189	60	17:40	18:40
09/07 190	60	17:40	18:40
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11/07 192	70	17:40	18:50
12/07 193	70	17:40	18:50
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06/08 218	50	17:50	18:40
07/08 219	40	17:50	18:30
08/08 220	40	17:50	18:30
09/08 221	30	18:00	18:30
10/08 222	30	18:00	18:30
11/08 223	30	18:00	18:30
12/08 224	20	18:00	18:20
13/08 225	10	18:10	18:20

Table 2 - Project: Heartland - Shadow Flicker Data - Turbine ID:1 <label>

Receptor ID:2
(Refer to Figure 2 in report for map of receptors)
Height: 2m
Easting: 329582m
Northing: 4489174m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	<label>	Hours per year	8
Day: dd/mm index	Maximum minutes	Start time hh:mm	Stop time hh:mm
Worst Day !: 160	20	18:40	19:00
07/06 158	10	18:40	18:50
08/06 159	10	18:40	18:50
09/06 160	20	18:40	19:00
10/06 161	20	18:40	19:00
11/06 162	20	18:40	19:00
12/06 163	20	18:40	19:00
13/06 164	20	18:40	19:00
14/06 165	20	18:40	19:00
15/06 166	20	18:40	19:00
16/06 167	20	18:40	19:00
17/06 168	20	18:40	19:00
18/06 169	20	18:40	19:00
19/06 170	20	18:40	19:00
20/06 171	20	18:40	19:00
21/06 172	20	18:40	19:00
22/06 173	20	18:40	19:00
23/06 174	20	18:40	19:00
24/06 175	20	18:40	19:00
25/06 176	20	18:40	19:00
26/06 177	20	18:40	19:00
27/06 178	20	18:40	19:00
28/06 179	20	18:40	19:00
29/06 180	20	18:40	19:00
30/06 181	20	18:40	19:00
01/07 182	20	18:40	19:00
02/07 183	20	18:40	19:00
03/07 184	10	18:50	19:00
04/07 185	10	18:50	19:00
05/07 186	10	18:50	19:00

Table 3 - Project: Heartland - Shadow Flicker Data - Turbine ID:1 <label>

Receptor ID:3

Height: 2m
Easting: 329406m
Northing: 4489185m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	<label>	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 4 - Project: Heartland - Shadow Flicker Data - Turbine ID:1 <label>

Receptor ID:4

Height: 2m
Easting: 329285m
Northing: 4489237m
Bearing: 180deg
Tilt: 0deg

Turbine ID:1	<label>	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 5 - Project: Heartland - Shadow Flicker Data - Turbine ID:1 <label>

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.

APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-4: Stakeholder List and Notice of Scoping

EA STAKEHOLDER LIST
Heartland Community College Wind Turbine Project
Normal, IL (McLean County)

Name	Title	Organization	Address	City and State	Zip
Ms. Sarah Sheehan		Office of the Governor	100 W. Randolph, 6-100 - James R. Thompson Center	Chicago, IL	60601
Mr. Thomas E. Jennings	Director	Illinois Department of Agriculture	State Fairgrounds, P.O. Box 19281	Springfield, IL	62794
Jonathan Feipel	Deputy Director	Illinois Department of Commerce and Economic Opportunity	500 East Monroe (Illinois Energy Office)	Springfield, IL	62701
Mr. Manuel Florez	Chairman	Illinois Commerce Commissior	527 East Capitol Avenue	Springfield, IL	62701
Mr. Doug Scott	Director	Illinois Environmental Protection Agency	1021 North Grand Ave. East - P.O. Box 19276	Springfield, IL	62794
Ms. Janet Grimes	Director	Illinois Historic Preservation Agency	1 Old State Capitol Plaza	Springfield, IL	62701
Mr. Marc Miller	Director	Illinois Department of Natural Resources	1 Natural Resources Way	Springfield, IL	62702
Mr. Gary Hannig	Secretary, Attn: Barbra Stevens, Environment Section	Illinois Department of Transportation	2300 S. Dirkesn Parkway	Springfield, IL	62764
Mr. Mark Pruitt	Executive Director	Illinois Power Agency	100 W. Randolph, 6-100 - James R. Thompson Center	Chicago, IL	60601
Mr. Phil Wallis	Vice President	National Audubon Society	225 Varick Street, 7th floor	New York, NY	10014
Ms. Michelle P. Scott	General Counsel	National Audubon Society	225 Varick Street, 7th floor	New York, NY	10014
Ms. Kim Van Fleet	Biologist National Audubon Society	Important Bird Area Coordinator and Staff	225 Varick Street, 7th floor	New York, NY	10014
Mr. Eric Glitzenstein		Meyer Glitzenstein & Crystal	1601 Connecticut Ave., N.W., Suite 700	Washington, D.C.	20009
Mr. William Eubanks		Meyer Glitzenstein & Crystal	1601 Connecticut Ave., N.W., Suite 700	Washington, D.C.	20009
Mr. Stephen Packard	Director	Audubon of the Chicago Region	1718 Sherman Avenue #210	Evanston, IL	60201
Mr. Joe Williams	NAGPRA Rep	Kickapoo Tribe	1107 Goldfinch Road	Horton, KS	66439
Mr. Earl Meshiguad		Potawatomi Hannaville Indian Community	N14911 Hannahville Boulevard Rd.	Wilson, MI	49896
Mr. Jimmy Finch	THPO	Potawatomi -Citizen Band	1601 Gordon Copper Dr.	Shawnee, OK	74801
Mr. Steve Ortiz		Potawatomi-Prarie Band			
Mr. Philip Shopodock	Chairman, Executive Council	Potawatomi-Forest County Community	PO Box 340	Crandon, WI	54520
Mr. Thomas Cuddy		Federal Aviation Administration- Office of Environment and Energy	800 Independence Avenue, SW, Room 900	Washington, DC	20591
Mr. Ken Westlake		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
Mr. Richard Nelson		USFWS - Rock Island Field Office	1511 47th Avenue	Moline, IL	61265
Ms. Jody Miller		USFWS - Rock Island Field Office	1511 47th Avenue	Moline, IL	61265
Ms. Heidi Woeber		USFWS - Rock Island Field Office	1511 47th Avenue	Moline, IL	61265
Mr. Matthew Sailor		USFWS - Rock Island Field Office	1511 47th Avenue	Moline, IL	61265
Mr. Jeffrey Gosse		USFWS - Region 3	1 Federal Drive	Ft. Snelling, MN	55111
Dr. James Hartman (Attn: SAIE_ESOH)	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
Ms. Cathy O'Connell	Army Region 5 Regional Environmental Coordinator	Horne Engineering Services, LLC Office of Regional Environmental and Government Affairs	Northern APG-EA	Aberdeen Proving Ground, MD	211010
Citizens for Clean Energy, Inc		Citizens for Clean Energy, Inc.	3417 Fourth Avenue, South	Great Falls, MT	59405
Mr. Greer Goldman	Assistant General Counsel	National Audubon Society- Audubon Public Policy Office	1150 Connecticut Avenue, NW	Washington, DC	20036
Mr. Steve Stockton		City of Bloomington	109 E. Olive Street	Bloomington, IL	61701
Mr. Michael Ireland		City of Bloomington Township	816 S. Mercer Avenue	Bloomington, IL	61701
Mr. William Friedrich		Bloomington Township Public Water District	16748 E. 825 North Road	Bloomington, IL	61705

EA STAKEHOLDER LIST
Heartland Community College Wind Turbine Project
Normal, IL (McLean County)

Name	Title	Organization	Address	City and State	Zip
Mr. Robert Carter		Bloomington and Normal Water Reclamation District	2015 West Oakland Ave. Rd. P.O. Box 3307	Bloomington, IL	61701
		Central Illinois Regional Airport	3201 CIRA Drive, Suite 200	Bloomington, IL	61704
Mr. Chris Koos	Mayor	Town of Normal	100 E. Phoenix Avenue. P. O. Box 589	Normal, IL	61761
Mr. Robert Cranston		Normal Township	P.O. Box 426	Normal, IL	61761
Mr. Jerry Henderson		Normal-Towanda Drainage District	11 Inglewood	Bloomington, IL	61704
Mr. Terry Lindberg		McLean County	115 E. Washington Street- Government Center (Rm. 401) P.O. Box 2400	Bloomington, IL	61702
		McLean County Historical Society	200 North Main Street	Bloomington, IL	61701
Mr. Scott Hoeft		McLean County Farm Bureau	2243 Westgate Drive, Suite 501	Bloomington, IL	61705
	McLean County Unit	University of Illinois Extension	402 North Hershey Road	Bloomington, IL	61704
Mr. Rhea Edge *		John Wesley Powell Audubon Society	P.O. Box 142	Normal, IL	61761
Mr. Dick Bishop		Sierra Club Prairie Group	P.O. Box 131	Urbana, IL	61803
Dr. Allen Goben		Heartland Community College	1500 W. Raab Road	Normal, IL	61761
Dr. Al Bowman		Illinois State University	421 Hovey Hall, Campus Box 1000	Normal, IL	61790
Mr. Richard Wilson		Illinois Wesleyan University	1312 Park Street	Bloomington, IL	61701
Mr. Joseph E. Crowe	Deputy Director, Region 3 Engineer	Illinois Department of Transportation	13473 IL Hwy. 133, P.O. Box 610	Paris, IL	61944
Ms. Darlene Wills	CDL Director	HCC Child Development Lab	1500 W. Raab Road	Noral, IL	61761
Mr. Jonathan L. Casebeer	Chief Environmental Branch	Illinois Department of Military Affairs	1301 North MacArthur Blvd.	Springfield, IL	62702

* Address updated based on public comments.

Department of Energy
Washington, DC 20585

July 16th, 2010

TO: Distribution List

SUBJECT: Notice of Scoping – Heartland Community College Wind Energy Project, Normal, Illinois (McLean 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 Heartland Community College's Wind Energy Project. Heartland Community College is proposing to install a single 1.5 megawatt (MW) wind turbine along with an associated gravel access road and electrical transmission equipment on the northern end of the Heartland Community College's campus, and just south of Interstate 55 in Normal, IL (GPS: *Lat.* 40.537781, *Long.* -89.015576). The proposed wind turbine would provide electricity directly to the college, enabling it to reduce the electrical demands of the institution and lower the carbon footprint associated with daily operations. The average elevation of the turbine site is 850 feet. The specific wind turbine has not been selected; however Heartland Community College has submitted their preferred turbine height of 397 feet above ground level to the Federal Aviation Administration (FAA) for their review and has received a "Determination of No Hazard to Air Navigation." 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 of 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

Heartland Community College
Wind Turbine Project Location
McLean County, Illinois

Heartland Community College
Wind Turbine Project Location
McLean County, Illinois

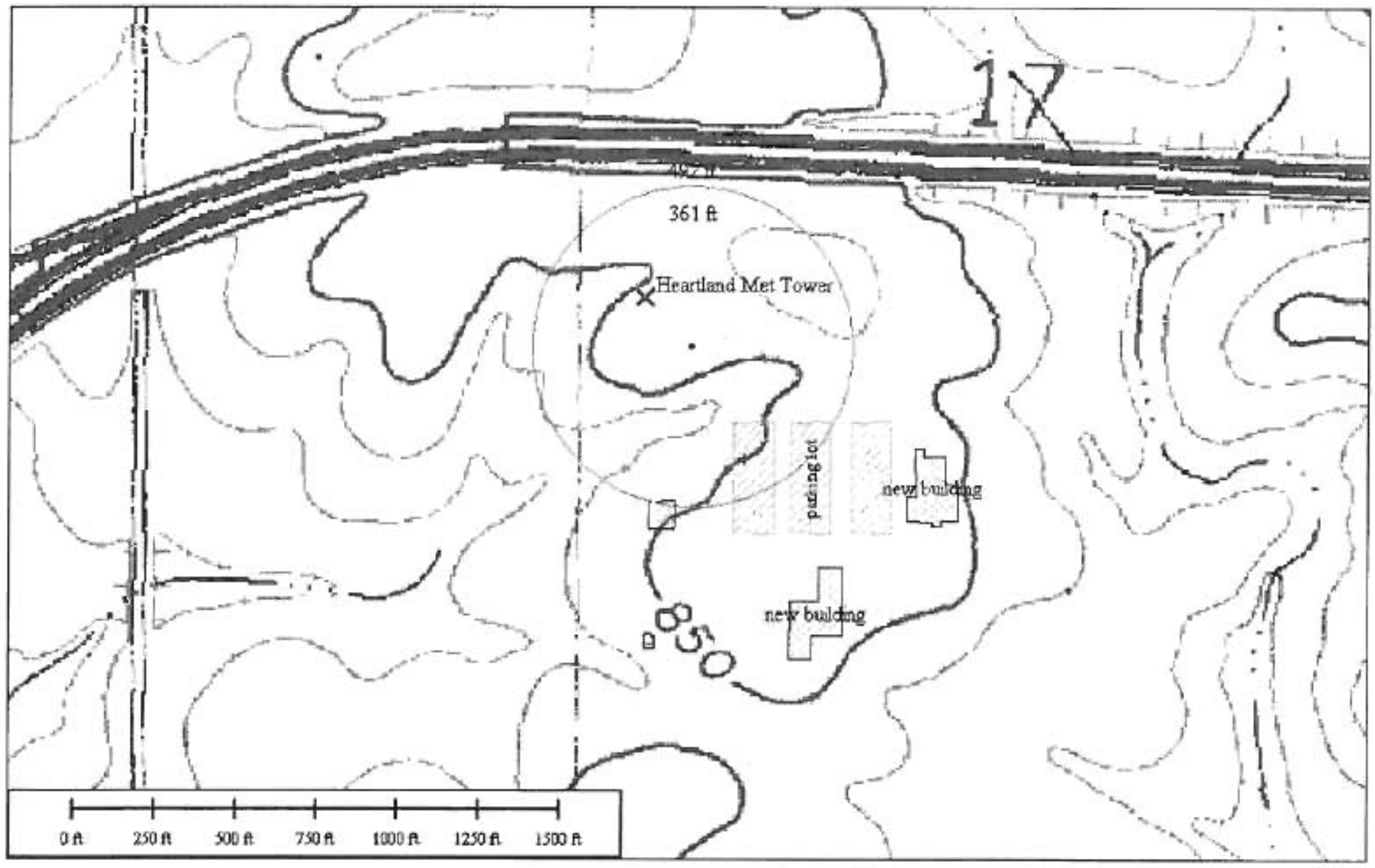

Figure 1 - Project Area- Topographical map

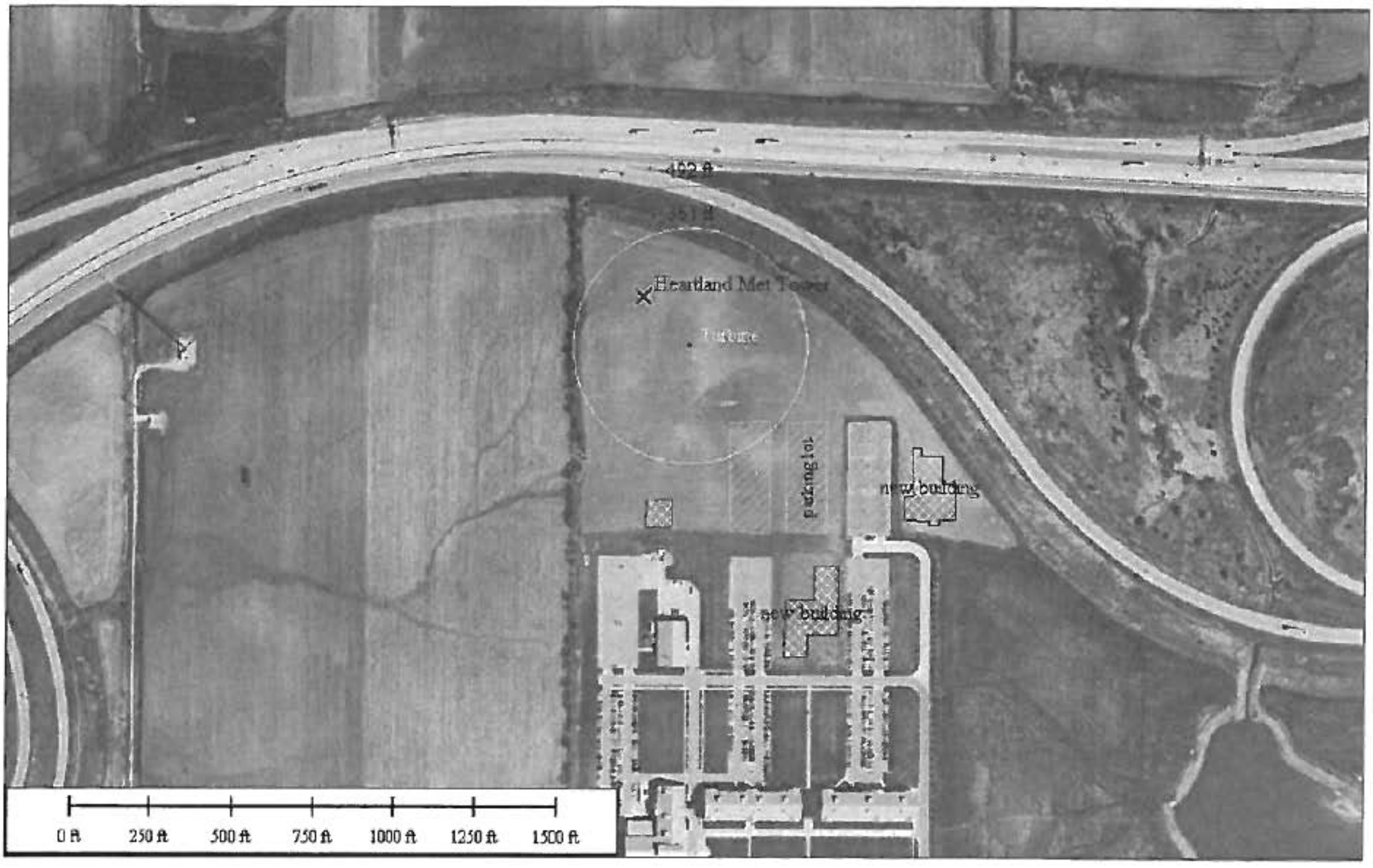

Figure 2 - Project Map- Aerial photo (Yellow ring - 1.1X, green ring – 1.5X)

NOTICE OF AVAILABILITY

The U.S. Department of Energy (DOE) is proposing to provide American Reinvestment and Recovery Act federal funding to the Illinois Department of Commerce and Economic Opportunity (DCEO) for Heartland Community College's (HCC) Wind Energy Project.

DOE's Proposed Financial Assistance to Illinois DCEO
Heartland Community College (HCC) Wind Energy Project
1500 W. Raab Rd., Normal, IL– McLean County
DOE/EA: 1807D

Heartland Community College is proposing to install a single 1.5 megawatt (MW) wind turbine on the north side of HCC's campus in Normal, IL. DOE's Golden Field Office has prepared a Draft Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA).

Comments on any potential issues and/or associated environmental impacts of implementing the proposed project will be accepted until ***October 16th, 2010*****.** DOE encourages your participation in this process.

You can submit comments by either mail or email. DOE Headquarters, c/o John Jediny (EE-3C), 1000 Independence Ave., SW, Washington, DC 20585, or by email to: John.Jediny@ee.doe.gov.

The Draft Environmental Assessment, with appendices is available for your review on the **DOE Office of NEPA Compliance & Golden Field Office Websites**:

http://nepa.energy.gov/draft_environmental_assessments.htm

http://www.eere.energy.gov/golden/reading_room.aspx

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NOTICE OF AVAILABILITY

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DOE's Proposed Financial Assistance to Illinois DCEO
Heartland Community College (HCC) Wind Energy Project
1500 W. Raab Rd., Normal, IL- McLean County DOE/EA: 1807D

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Comments on any potential issues and/or associated environmental impacts of implementing the proposed project will be accepted until October 16th, 2010. DOE encourages your participation in this process.
You can submit comments by either mail or email. DOE Headquarters, c/o John Jediny (EE-3C), 1000 Independence Ave., SW, Washington, DC 20585, or by email to: John.Jediny@ee.doe.gov.
The Draft Environmental Assessment, with appendices is available for your review on either the DOE NEPA or the Golden Field Office websites:

http://nepa.energy.gov/draft_environmental_assessments.htmhttp://www.eere.energy.gov/golden/Reading_Room.aspx

Oct 01, 2010 Save ad ☐

Accounts Payable Clerk

We seek applicants for a full-time position responsible for accounts payable functions and processing payments for College and Foundation funds. Also serves as the primary liaison between the College and external vendors regarding accounts payable. Requires an associate's degree in a business oriented field of study or minimum of two years' related work experience. Preferred qualifications include keyboarding and accounting / accounts payable skills, familiarity with PeopleSoft or another ERP system, and proficiency with Microsoft Office products.
Review of applications will begin on October 11, 2010 and continue until position is filled. For consideration, please submit letter of application and resume to:

Human Resources
1500 W. Raab Road
Normal, IL 61761

Heartland Community College strategic goals affirm the value
of diversity among students
and employees. Heartland
Community College is an equal opportunity employer.

HEARTLAND
COMMUNITY COLLEGE

Sep 26, 2010 Save ad

**Child Health and
Development Specialist**

**focus in Health and Nutrition
40 hrs/52 wks/yr., $14.48/hr.
5% incentive for Bilingual/
Spanish speaking individuals**

Position requires two year degree in nursing and/or licensed RN, experience with an early childhood program is preferred. Excellent organizational skills, ability to communicate effectively, coordinate with various community agencies, pass DCFS background check, valid IL drivers license and reliable insured transportation. If qualified submit letter of interest, resume, 3 letters of recommendation and College transcripts by noon Sept. 28, 2010 to

Heartland Head Start, Attn: C Busick
206 Stillwell, Bloomington, IL 61701
or fax 309-662-9470. EOE

Sep 19, 2010 Save ad

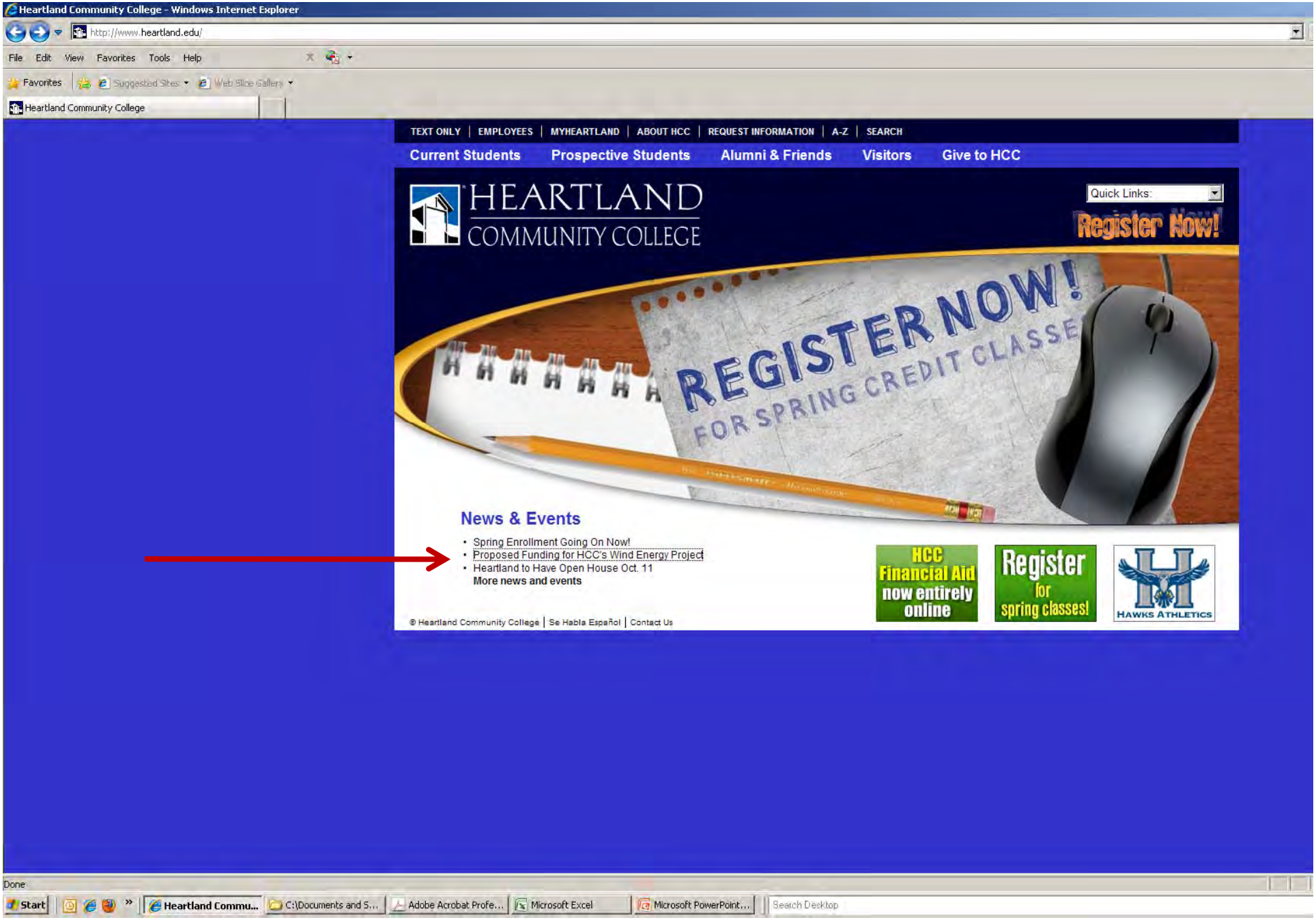
COLLEGE PARK DR., 212 - Quiet, 2 bedroom, dishwasher, remodeled, No pets, $450/mo. Ph. 309-275-1829,
Close to Heartland, ISU, Parkside Dist.

Sep 10, 2010 Save ad

Heartland Apartment Management
Ph. 309-828-8105

Sep 04, 2010 Save ad

Top of Page



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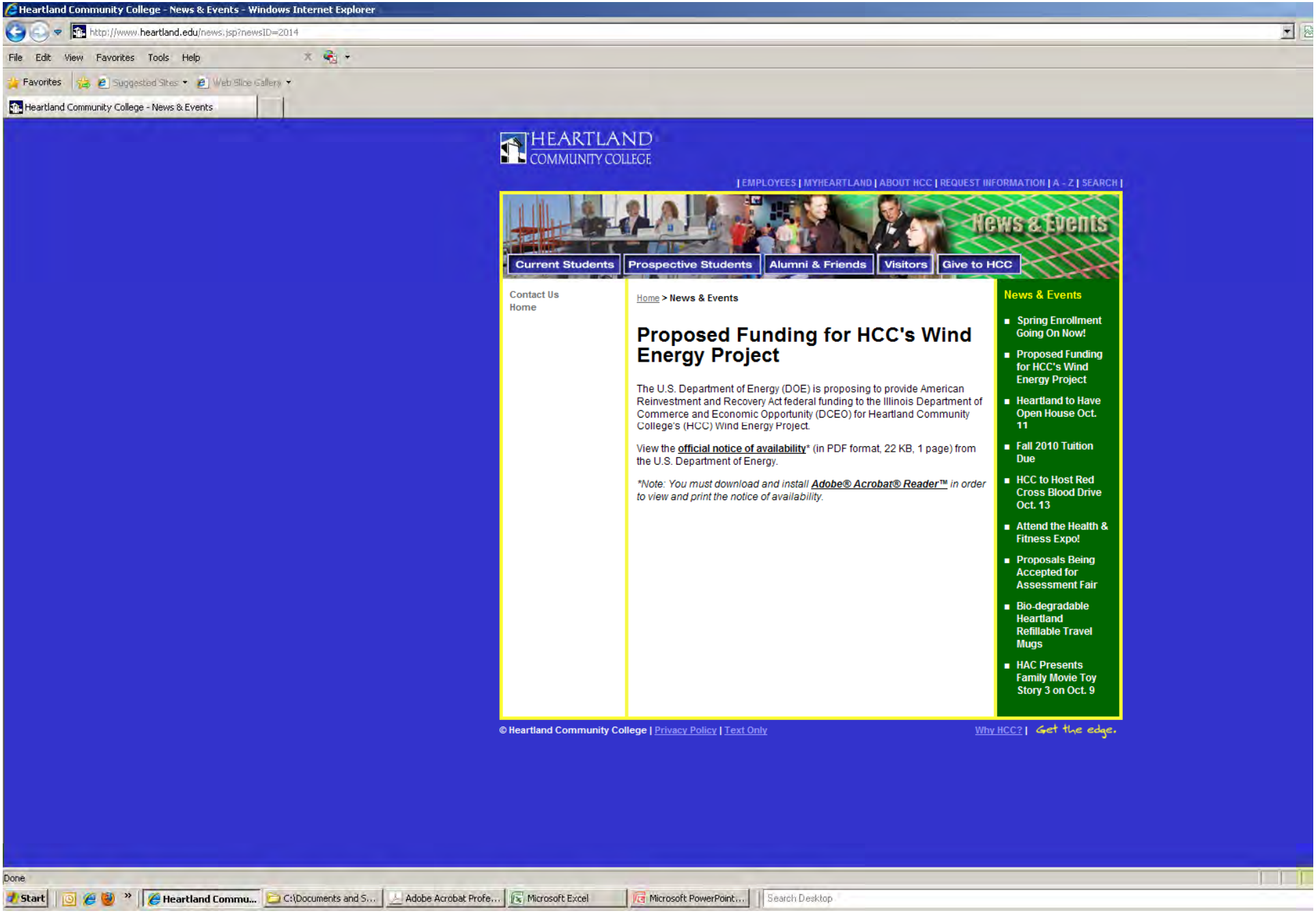

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APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-5: GE xle 1.5MW Specifications

GE Energy

1.5MW
Wind Turbine

imagination at work

a product of
ecomagination

The industry workhorse

The world needs a reliable, affordable and clean supply of electric power with zero greenhouse gas emissions, which is why GE continues to drive investment in cutting-edge wind turbine technology.

Building on a strong power generation heritage spanning more than a century, our 1.5 MW wind turbine—also known as the industry workhorse—delivers proven performance and reliability, creating more value for our customers.

Our product strategy is focused on results that contribute to our customers' success and wind farm return on investment. Every initiative we pursue bears our uncompromising commitment to quality and product innovation. Our reputation for excellence can be seen in everything we do. GE's commitment to customer value and technology evolution is demonstrated in our ongoing investment in product development. Since entering the wind business in 2002, GE has invested over $850 million in driving reliable and efficient wind technology.

GE 1.5 MW...the most widely used wind turbine in its class

- **12,000+** turbines are in operation worldwide
- **19** countries
- **170+** million operating hours
- **100,000+** GWh produced

Data as of March, 2009

Global footprint

GE Energy is one of the world's leading suppliers of power generation and energy delivery technologies—providing comprehensive solutions for coal, oil, natural gas and nuclear energy; renewable resources such as wind, solar and biogas, and other alternative fuels. As a part of GE Energy Infrastructure—which also includes the Water, Energy Services and Oil & Gas businesses—we have the worldwide resources and experience to help customers meet their needs for cleaner, more reliable and efficient energy.

GE has six wind manufacturing and assembly facilities in Germany, Spain, China and the United States. Our facilities are registered to both ISO 9001:2000 and our Quality Management System, providing our customers with quality assurance backed by the strength of GE. Our wind energy technology centers of excellence in Europe, Asia, and North America, as well as our teams of engineers and scientists, use Six Sigma methodology coupled with the latest computational modeling and power electronic analysis tools to manufacture wind turbines with the performance and reliability necessary to meet our customers' challenges.

As the cornerstone of GE technology for more than 100 years, our four Global Research Centers are focused on developing breakthrough innovations in the energy industry. We believe wind power will be an integral part of the world energy mix throughout the 21st century and we are committed to helping our customers design and implement energy solutions for their unique energy needs.

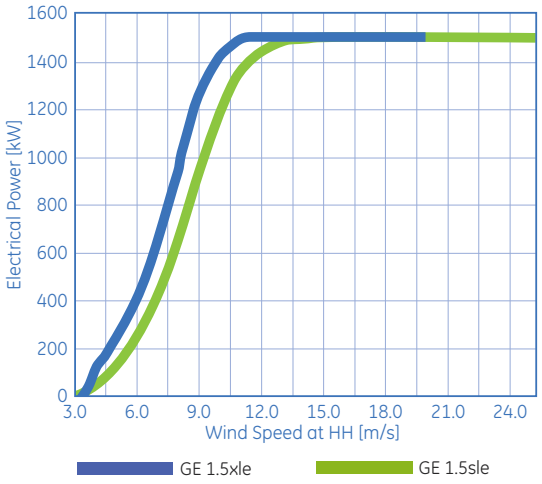
Advancing wind capture performance

As a leading global provider of energy products and services, GE continues to invest in advancing its 1.5 MW wind turbine product platform. With a core focus on enhancing efficiency, reliability, site flexibility and delivering multi-generational product advancements, GE's 1.5 MW wind turbine is the most widely used turbine in its class. Our commitment is to fully understand our customer's needs and respond with new technology enhancements aimed at capturing maximum wind energy to deliver additional return on investment.

Technical data

		1.5sle	1.5xle
Operating Data			
Rated Capacity:		1,500 kW	1,500 kW
Temperature Range: (with Cold Weather Extreme Package)	Operation:	-30°C – +40°C	-30°C – +40°C
	Survival:	-40°C – +50°C	-40°C – +50°C
Cut-in Wind Speed:		3.5 m/s	3.5 m/s
Cut-out Wind Speed (10 min avg.):		25 m/s	20 m/s
Rated Wind Speed:		14 m/s	11.5 m/s
Wind Class — IEC:		IIa (V_{e50} = 55 m/s V_{ave} = 8.5 m/s)	IIIb (V_{e50} = 52.5 m/s V_{ave} = 8.0 m/s)
Electrical Interface			
Frequency		50/60 Hz	50/60 Hz
Voltage		690V	690V
Rotor			
Rotor Diameter:		77 m	82.5 m
Swept Area:		4657 m^2	5346 m^2
Tower			
Hub Heights:		65/80 m	80 m
Power Control		Active Blade Pitch Control	Active Blade Pitch Control

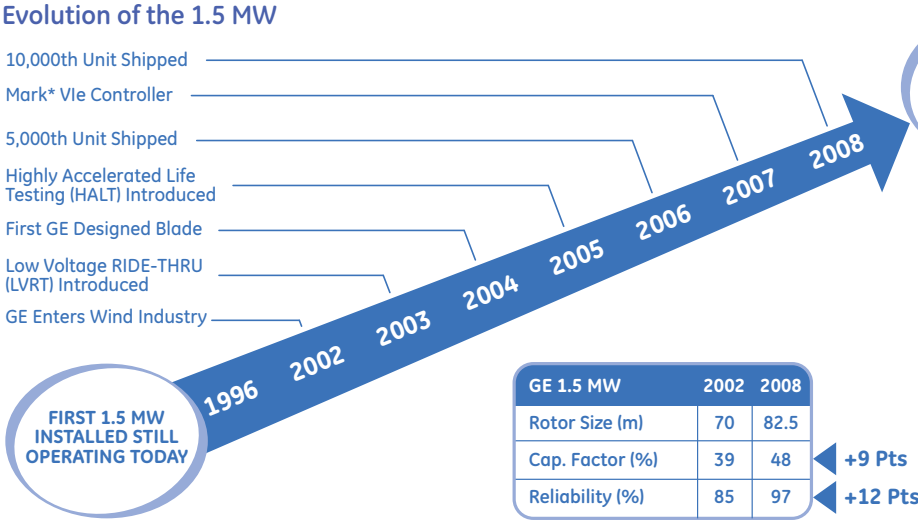
Power curve



1.5sle — *Classic workhorse, an efficient and reliable machine with proven technology*
1.5xle — *Built on the success of the 1.5sle platform, captures more wind energy with 15% greater swept area*

GE's 1.5 MW wind turbine is designed to maximize customer value by providing proven performance and reliability. GE's commitment to customer satisfaction drives our continuous investment in the evolution of the 1.5 MW wind turbine through technological enhancements.

Evolution of the 1.5 MW



GE 1.5 MW	2002	2008	
Rotor Size (m)	70	82.5	
Cap. Factor (%)	39	48	+9 Pts
Reliability (%)	85	97	+12 Pts

Commitment to continued investment

GE's commitment to investing in technology and increasing customer value is demonstrated with our exciting new customer options for increasing turbine performance, flexibility and reliability.

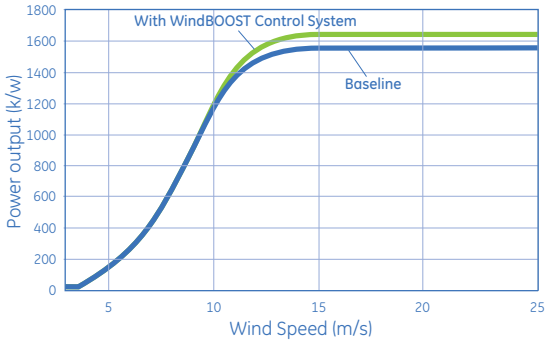
Enhanced performance

WindBOOST* Control System

This exciting new customer option for increasing performance, WindBOOST* control system, is a unique offering in the wind industry and the latest addition to the 1.5 MW product platform. This software upgrade provides:

- Up to 4% increased annual energy production (AEP), resulting in higher return on investment.
- Patent-pending control technology for optimum rotational speed, resulting in increased energy production.
- Remote capability to turn feature on and off at the turbine level.
- Increased power output while maintaining grid stability.

WindBOOST* Control System
Power Curve Density 1.2 (kg/m^3)



Improved flexibility

Reinforced Tower

GE's investment in a reinforced tower design opens up new potential wind sites for our customers, enabling us to deliver reliable and safe products that meet product and regulatory compliance expectations. GE's reinforced tower sections have the same length and external diameter as the standard GE North American modular system, but are specially built to handle seismic loads.

- Allows wind farms to be located in designated seismic prone areas with good wind resources.
- GE provides an evaluation to determine if the site requires reinforced tower due to seismic activity.

Increased reliability

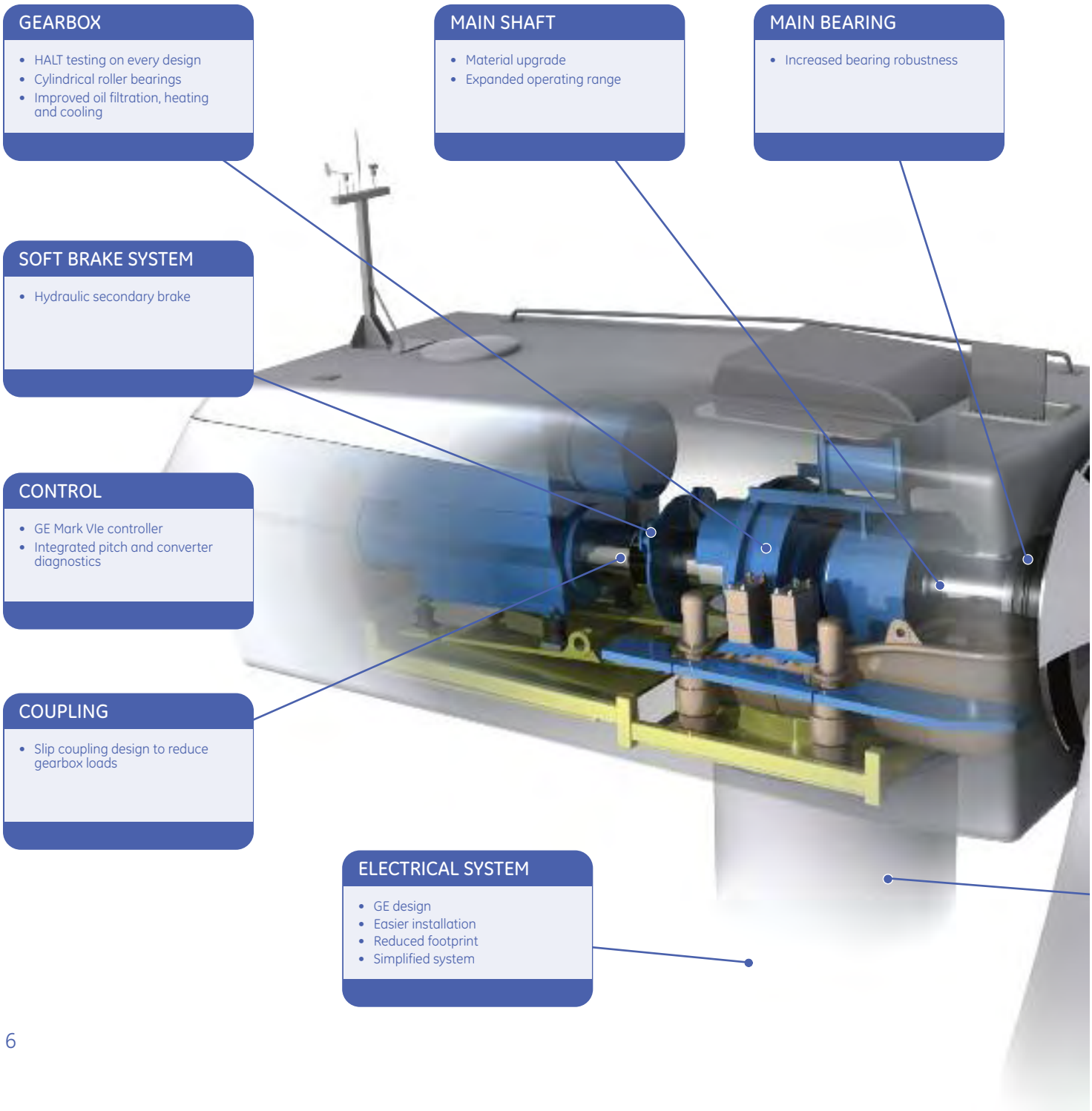
Condition Based Maintenance (CBM)

GE Energy's integrated Condition Based Maintenance (CBM) system proactively detects impending drive train issues, enabling increased availability and decreased maintenance expenses. Factory or field installed and tested, the CBM solution can improve reliability on a single wind farm or multiple wind farms. GE's CBM allows operators to understand an issue weeks—or even months—in advance. This permits operators to:

- Continue to produce power while parts, crane, and labor are resourced.
- Plan multiple maintenance events with the same resources.
- Reduce or limit the extent of damage to the drivetrain and reduce repair costs.

Leading reliability and availability perform

GE's 1.5 MW wind turbine and services are designed to set the industry standard for product reliability and availability performance. GE's continual investments in technology, established infrastructure, research capabilities and globally recognized business processes allow GE to create and deliver customer value by maximizing energy capture and return on investment. This is evident through our model year performance trend where availability performance significantly improves each year.



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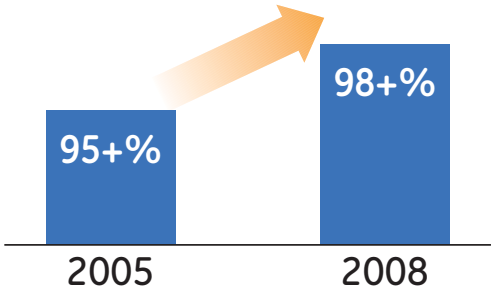
Delivering reliability through advanced technology

To optimize turbine reliability and availability, GE focuses on reducing the number of downtime faults, and providing faster Return-to-Service (RTS). Our rigorous design and testing process—including specialized 20-year fatigue testing and Highly Accelerated Life Testing (HALT)—reflects our ongoing investment in key turbine components.

1.5 model year availability



PITCH

- GE designed pitch electronics
- Increased pitch drive robustness
- Greater torque

BLADES

- Includes GE designs
- Improved capacity factor
- HALT testing

TOWER

- Modular tower system
- Hub height flexibility

Technological expertise

GE Infrastructure

Energy

- Controls, materials, power electronics
- Fulfillment and logistics capability
- Efficient supply chain management

Aviation

Aerodynamic and aero-acoustic modeling expertise

Rail

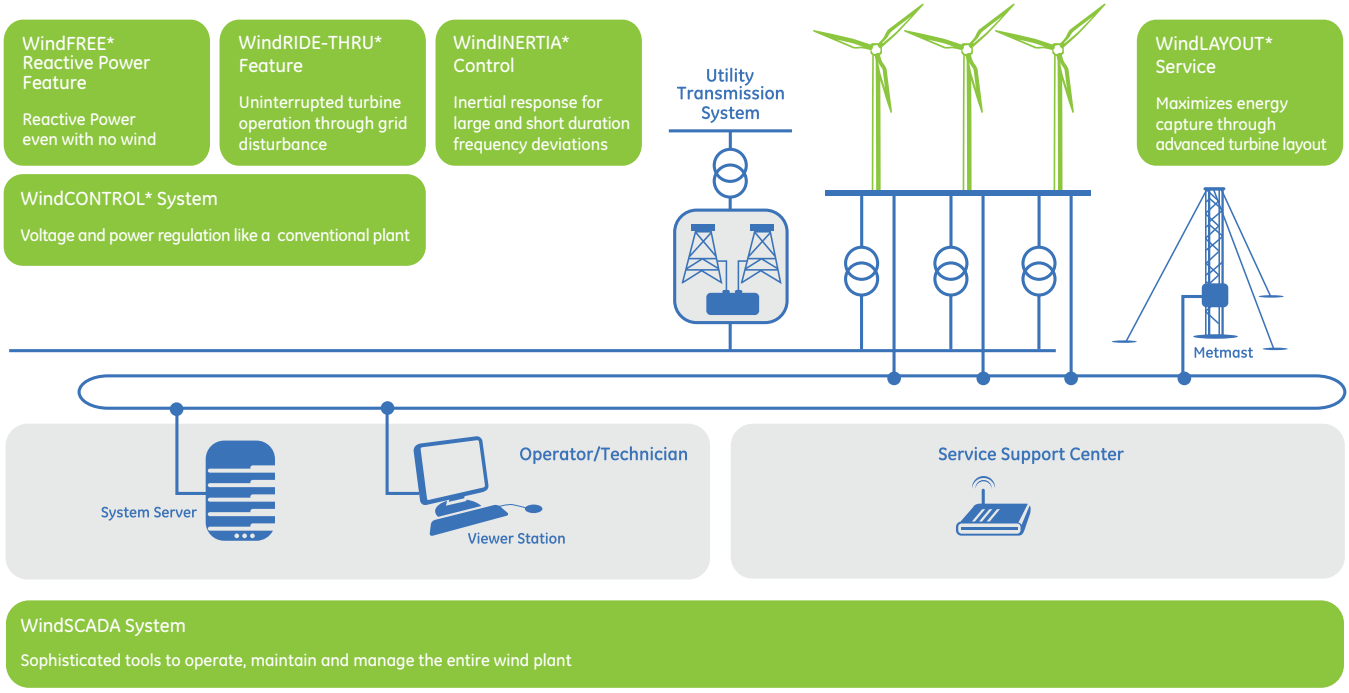
Gearbox and drive train technologies

GE Global Research

- Energy conversion
- Material sciences
- Smart grids

Optimized wind power plant performance

Wind turbine performance is a critical issue in light of increasingly stringent grid requirements. GE's unrivaled experience in power generation makes us the industry leader in grid connection. By providing a sophisticated set of grid-friendly benefits similar to conventional power plants, GE's patented integrated suite of controls and electronics take your wind power plant to the frontline of performance and seamless grid integration.



FEATURE	DESCRIPTION	BENEFITS
WindCONTROL* System	Voltage and power regulation like a conventional power plant	Ability to supply and regulate reactive and active power to the grid Additional features include power frequency droop, power ramp rate limiters and integrated capacitor/reactor bank control
WindFREE* Reactive Power Feature	Provides reactive power even with no wind	Provides smooth fast voltage regulation by delivering controlled reactive power through all operating conditions Eliminates the need for grid reinforcements specifically designed for no-wind conditions
WindRIDE-THRU* Feature	Low voltage, zero voltage and high voltage ride-through of grid disturbances	Uninterrupted turbine operation through grid disturbances Meets present and emerging transmission reliability standards
WindINERTIA* Control	Provides temporary boost in power for under-frequency grid events	Provides inertial response capability to wind turbines that is similar to conventional synchronous generators without additional hardware
WindLAYOUT* Service	Service to optimize turbine layout for a site	Opportunity to increase annual energy production for a site
WindSCADA System	Tools to operate, maintain and manage wind power plant	Real-time data visualization, reporting on historical data, alarm management and secure user access

Project execution

GE understands that grid compatibility, site flexibility, and on-time delivery are critical to the economics of a wind project. That's why the 1.5 MW wind turbine has been engineered for ease of integration and delivery to a wide range of locations, including those with challenging site conditions.

Our global project management and fulfillment expertise offer customers on-time delivery and schedule certainty. Regardless of where wind turbine components are delivered, GE's integrated logistics team retains ownership and responsibility for this critical step. Utilizing the GE Energy Power Answer Center, our engineering and supply chain teams are ready to respond to any technical, mechanical or electrical questions that may arise.

As one of the world's largest power plant system providers, GE is uniquely positioned to provide customers with full-service project management solutions. With offices in North America, Europe, and Asia, our world class Global Projects Organization utilizes decades of fulfillment expertise in project management, logistics, plant start-up and integration from Gas Turbine, Combined Cycle, Hydro, and Aero plants.

Here are some examples of how GE has worked with customers to solve project challenges and maximize their value through on-time delivery and advanced logistic capabilities:

Challenge:
Site with late grid availability due to project location change

GE's solution:
Pre-commissioning service: GE can bring portable generators on site and pre-commission turbines even without back feed power

Customer benefit:
Faster commissioning once grid became available

Challenge:
Project site with difficult geographic access

GE's solution:
Well-choreographed team with challenging terrain transportation expertise

Customer benefit:
More site flexibility; schedule target met

World-class customer service

GE's wind turbine fleet is one of the fastest growing and best-run fleets in the world. Utilizing our decades of experience in product services in the power generation industry, GE provides state-of-the-art solutions to ensure optimal performance for your wind plant.

24x7 Customer Support

GE's customer support centers in Europe and the Americas provide remote monitoring and troubleshooting for our installed fleet of wind turbines around the world, 24 hours a day, 365 days a year. The customer support centers are able to quickly perform remote resets for over 250 turbine faults. It is one of the most effective ways to ensure continuous monitoring and fault resets of your wind assets by qualified technology experts.

Technical Skills and In-depth Product Knowledge

GE's wind customer support centers have dedicated teams to dispatch for troubleshooting, repair and maintenance, available 24 hours a day, 365 days a year. This model ensures wide coverage of large wind turbine fleets without compromising technical skills or quality.

GE taps into our extensive product knowledge for timely resolution of many issues. All turbine faults are investigated using a structured technical process, which is then escalated as necessary. We also use feedback from this process in product development.

Operations and Maintenance Support

Driven by a highly skilled work force and the operating knowledge of over 12,000 1.5 MW wind turbines, GE offers a wide range of services tailored to the operation and maintenance needs of your wind assets. Our offerings range from technical advisory services, transactional services and remote operations to full on-site operations support including availability guarantees.

Parts Offerings

GE has utilized the extensive Parts and Refurbishment experience of its Energy Services business to establish a global center of excellence for wind parts operations. The wind parts resources are aligned to provide a full range of offerings for all types of parts and refurbishment needs, including routine maintenance kits, consumables and flow parts, and key capital parts such as gearboxes and blades.

With the launch of our 24/7 parts call center (877-956-3778), and the development of online ordering tools, we are increasing the channels that our wind plant operators can utilize to order required wind turbine parts, including emergency requests for down-turbine needs.

For wind plant operators looking for additional benefits that a contractual parts relationship with GE can offer, the wind parts team has developed tailored offerings that can provide ongoing inventory-level support and parts lead-time guarantees. One of the exciting advantages of a GE wind parts and refurbishment program is membership in the capital parts pool, with a priority access to often hard-to-source capital parts.

Conversions, Modifications and Uprates (CM&U)

Continuous technological improvements are key for GE to be a world leader in the wind industry. Our CM&U offerings utilize the new technology developments in the 1.5 MW platforms to improve the performance of existing assets. These offerings are designed to improve reliability and availability, and increase turbine output and improve grid integration.

Long-Term Asset Management Support

GE is your reliable partner as we strive to build long-term relationships with asset managers. Utilizing our strengths, we can provide parts solutions, field technician and customer training, and a wide range of specialized services to complement local on-site capabilities.

Environmental Health and Safety, a GE commitment

Maintaining high Environmental Health and Safety (EHS) standards is more than simply a good business practice; it is a fundamental responsibility to our employees, customers, contractors, and the environment we all share.

GE is committed to maintaining a safe work environment. We incorporate these values into every product, service and process, driving EHS processes to the highest standards.

Powering the world...responsibly.

For more information, please visit
www.ge-energy.com/wind
or contact your GE Energy sales representative at
800-821-2222

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APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-6: IHPA List of Historic Illinois Tribes

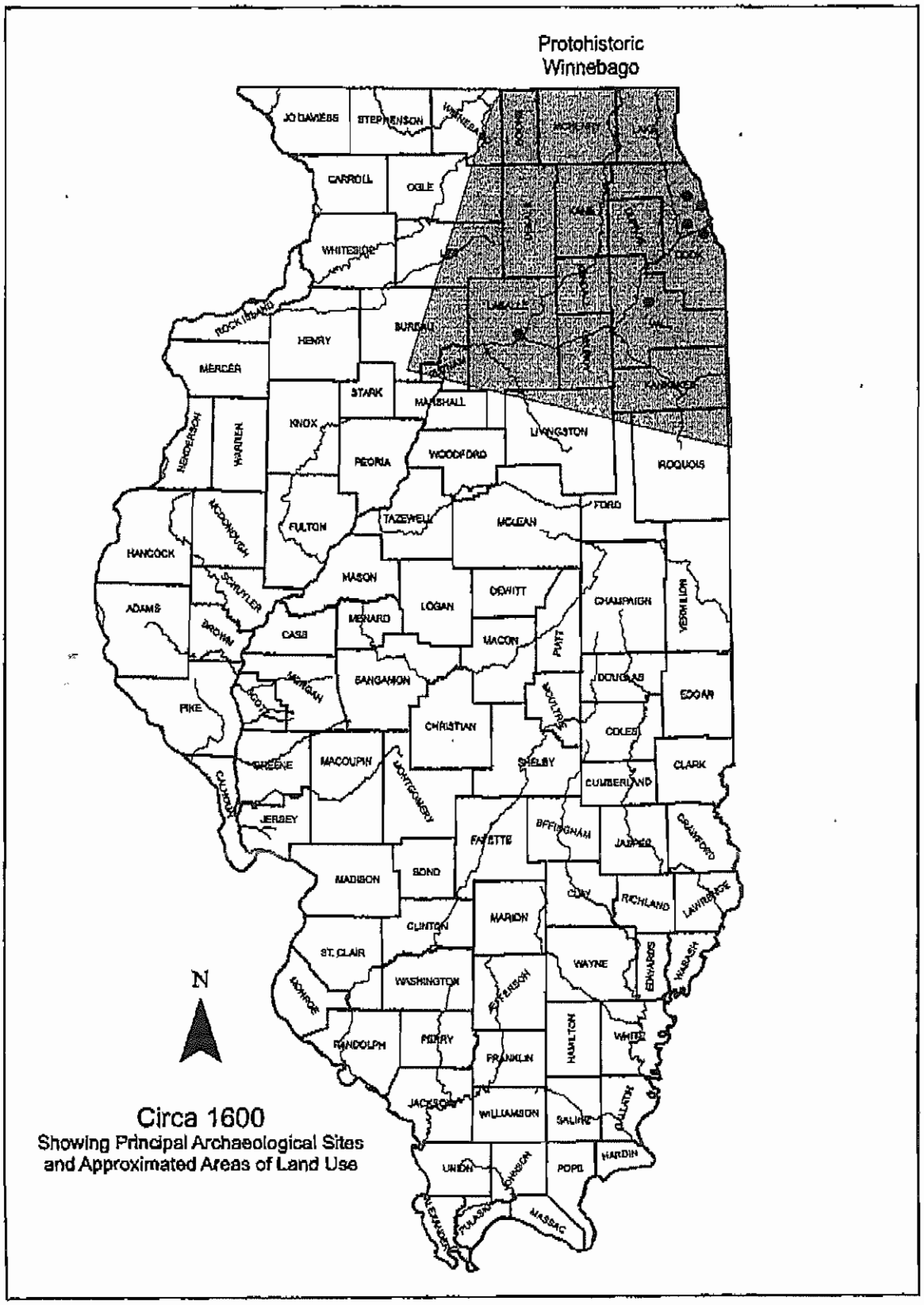
Illinois Tribal Consultation Workshop Tribe Contact List

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 thekina@huntel.net	No


Protohistoric
Winnebago
JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
CARROLL
OGLE
DEKALB
COOK
WHITESIDE
KANE
DUPAGE
LA SALLE
ROCK ISLAND
HENRY
BUREAU
GRUNDY
KENDALL
WILL
MERCER
STARK
MARSHALL
KANKAKEE
KNOX
LIVINGSTON
HENDERSON
WARREN
PEORIA
WOODFORD
IROQUOIS
FORD
MCDONOUGH
FULTON
TAZEWELL
MCLEAN
HANCOCK
SCHUYLER
MASON
DEWITT
CHAMPAIGN
VERMILION
ADAMS
BROWN
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LOGAN
MACON
PIATT
MORGAN
SANGAMON
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MACOUPIN
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CALHOUN
MONTGOMERY
CUMBERLAND
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PERRY
FRANKLIN
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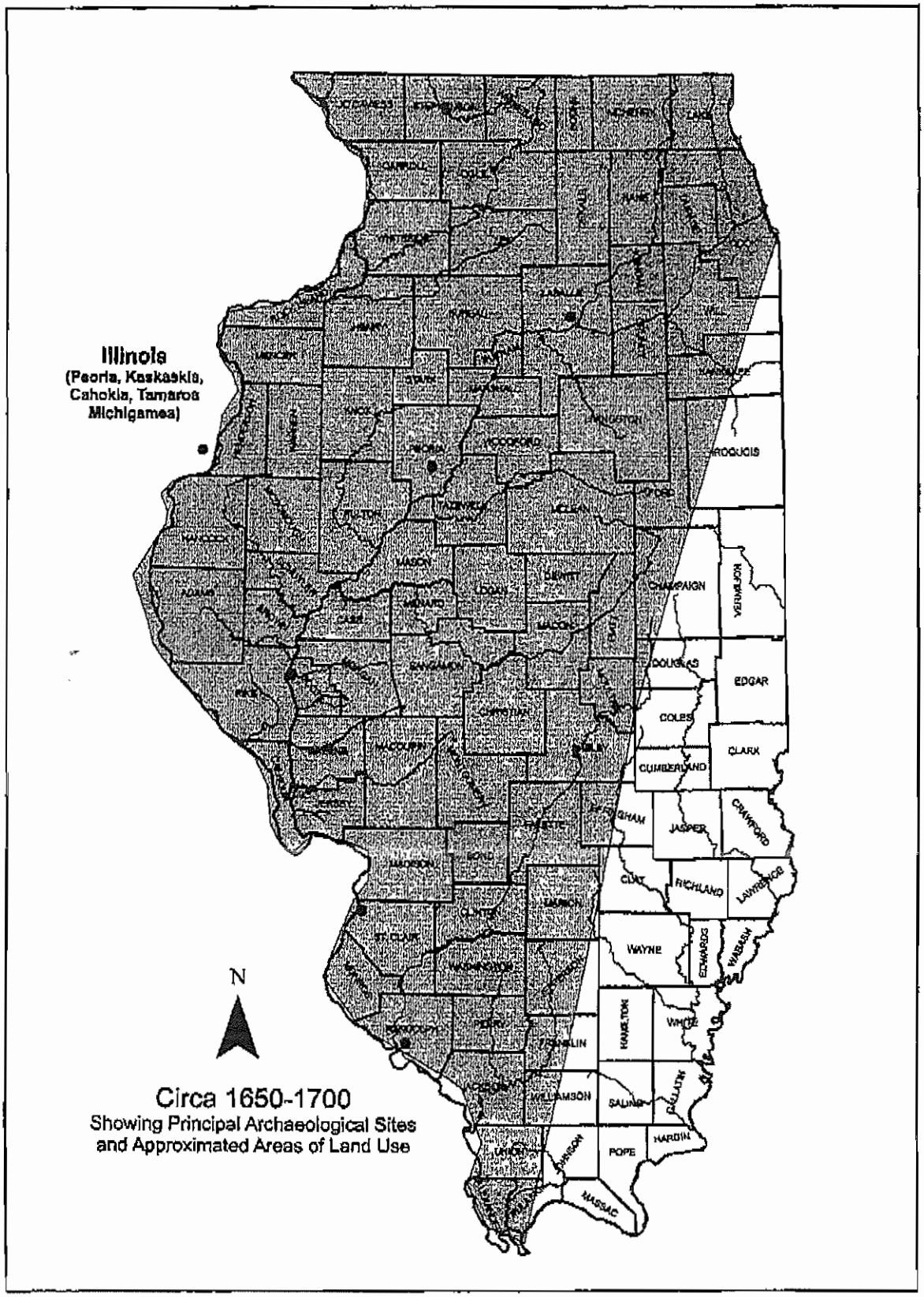
Circa 1600
Showing Principal Archaeological Sites
and Approximated Areas of Land Use


Illinois
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Circa 1650-1700
Showing Principal Archaeological Sites and Approximated Areas of Land Use
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CUMBERLAND
JASPER
CRAWFORD
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LAWRENCE
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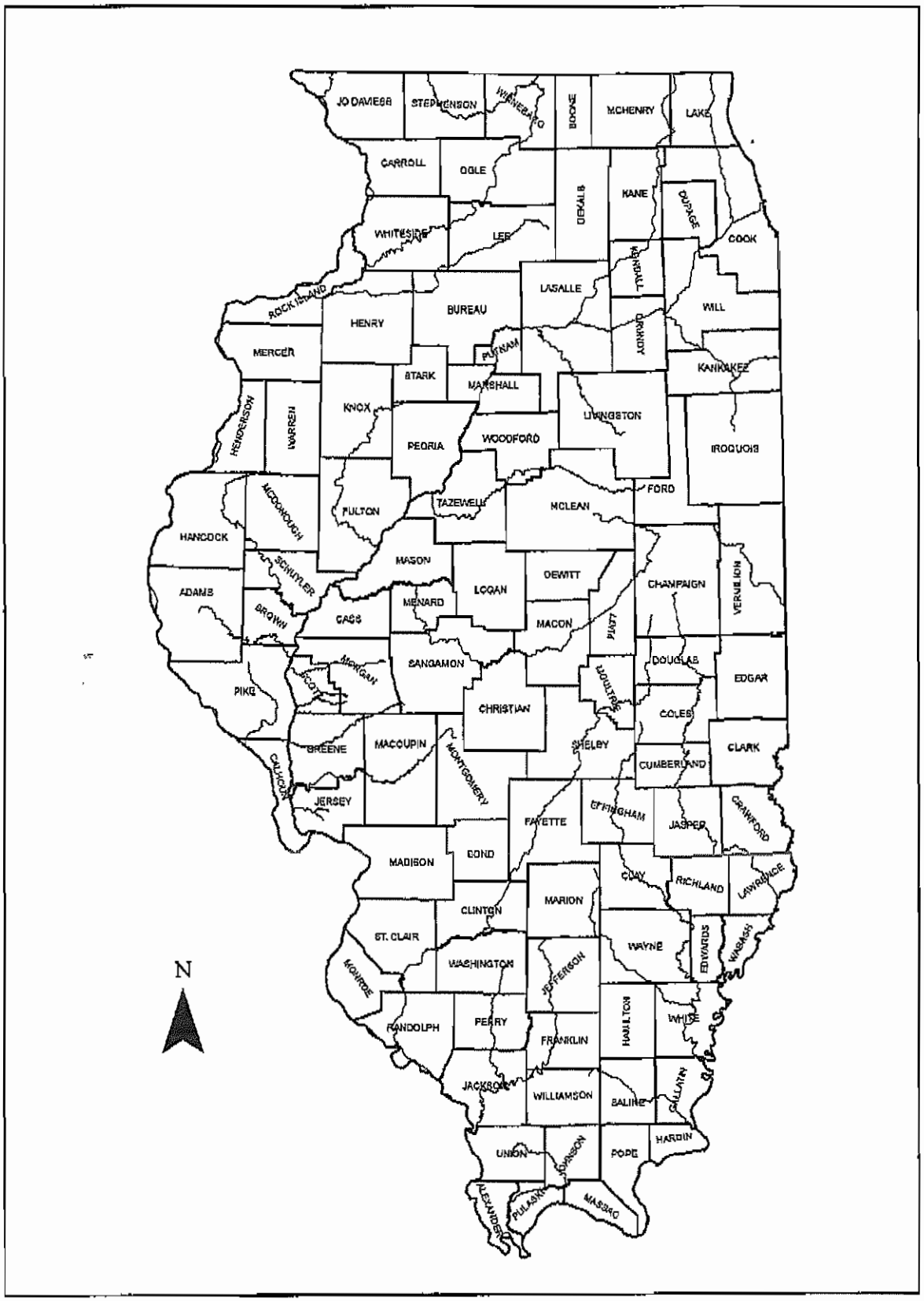
Circa 1750-1800
Showing Principal Archaeological Sites
and Approximated Areas of Land Use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TAZEWELL
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HANCOCK
SCHUYLER
MASON
LOGAN
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CHAMPAIGN
VERMILION
ADAMS
BROWN
CASS
MENARD
MACON
PIATT
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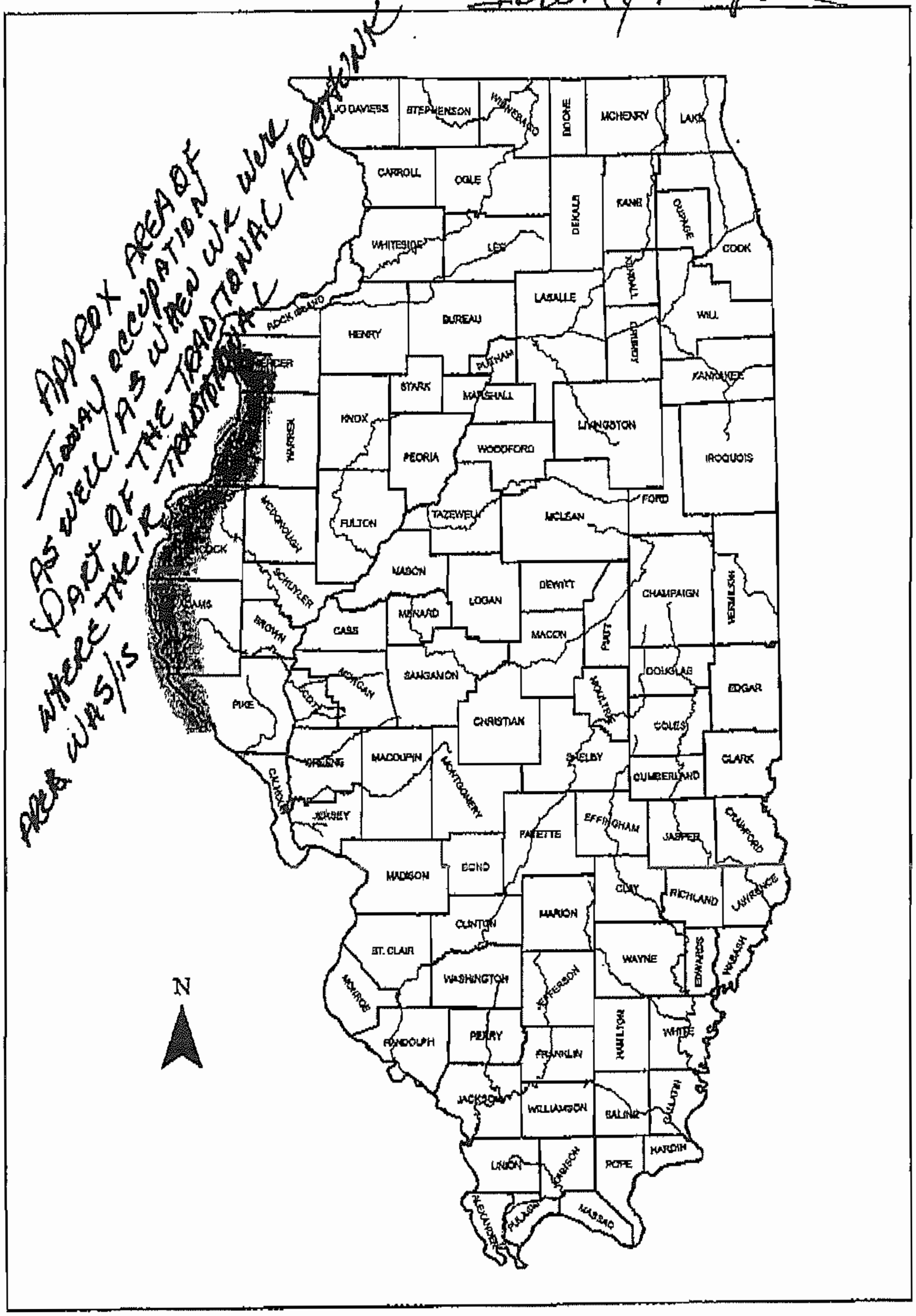
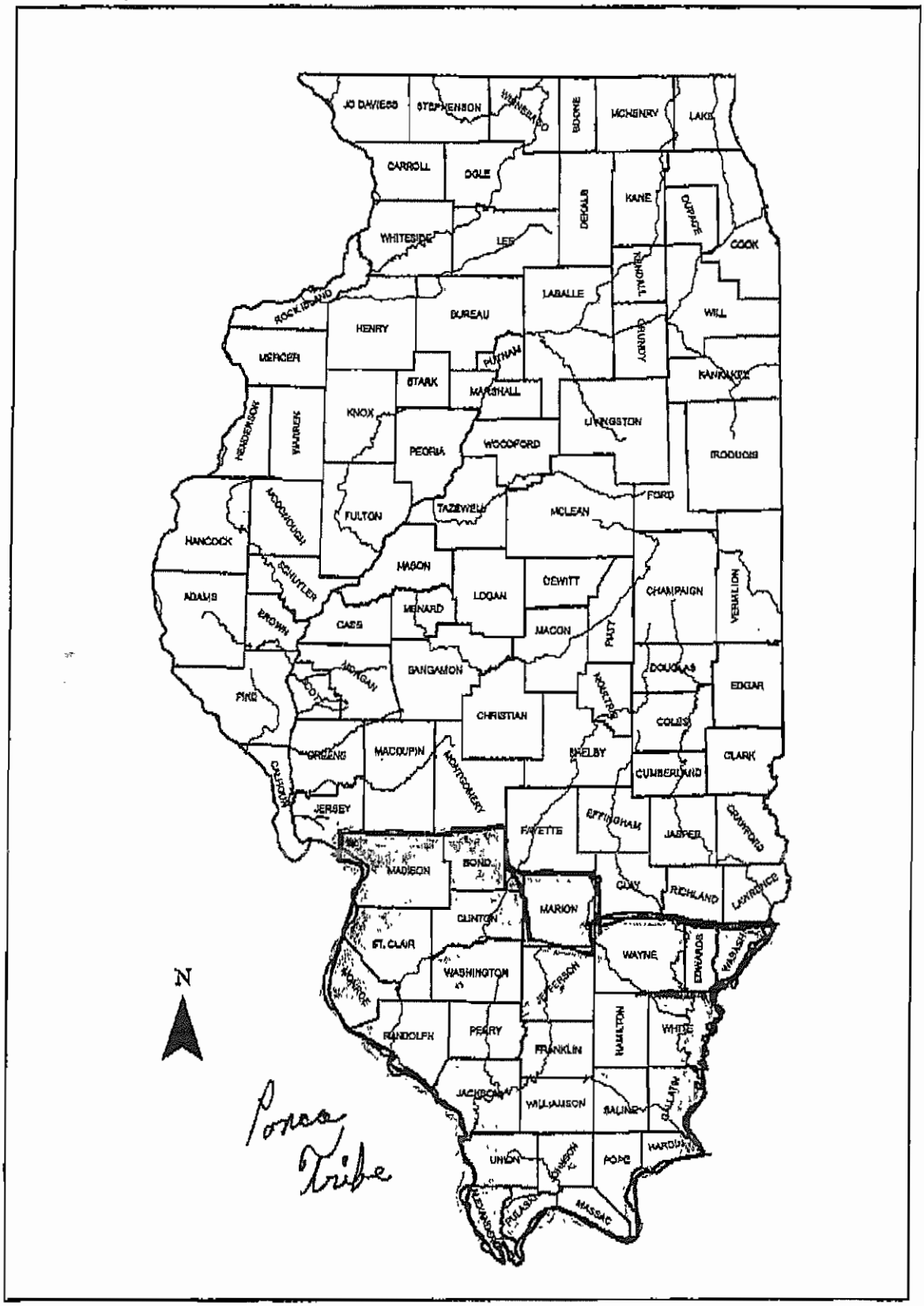
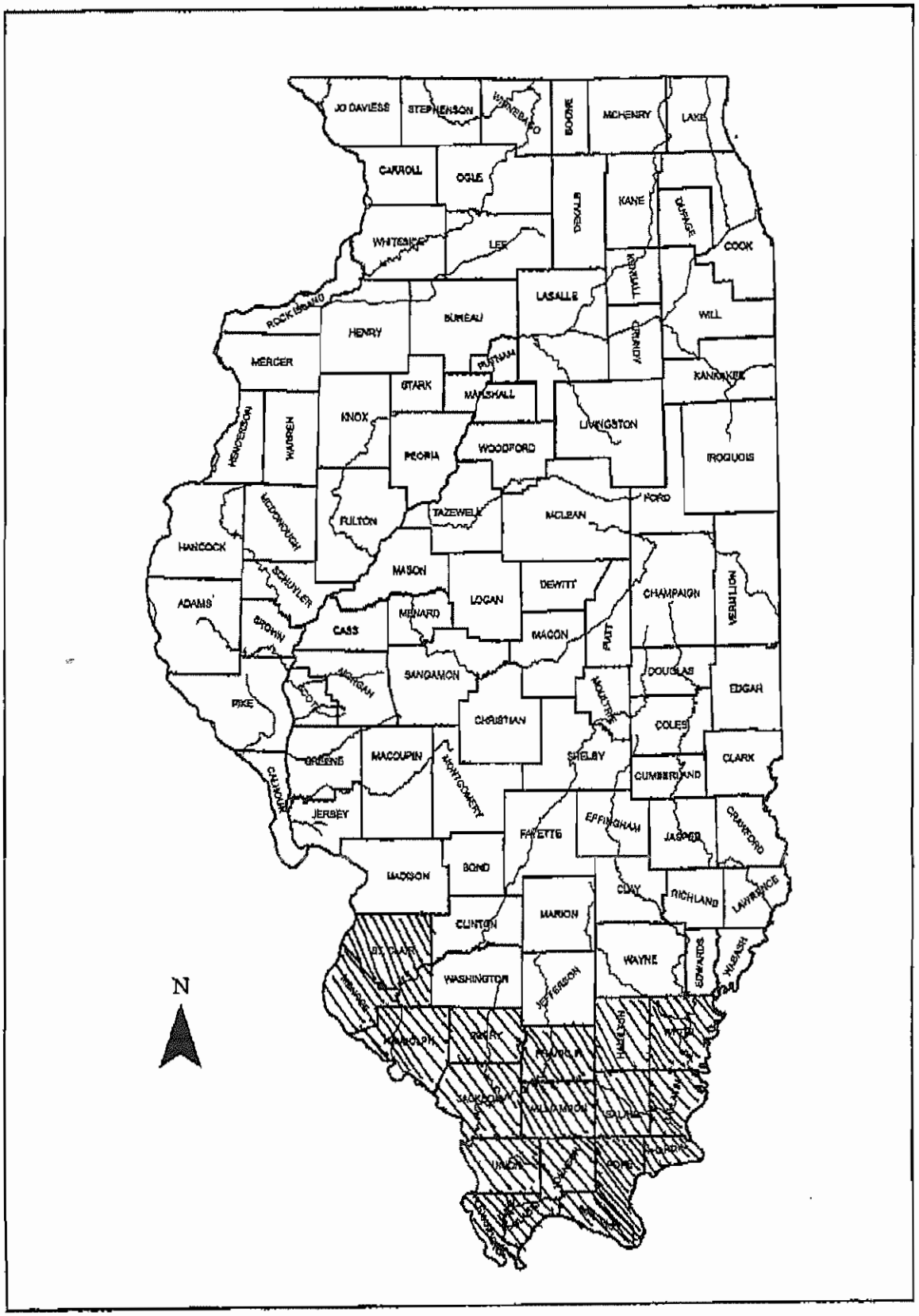


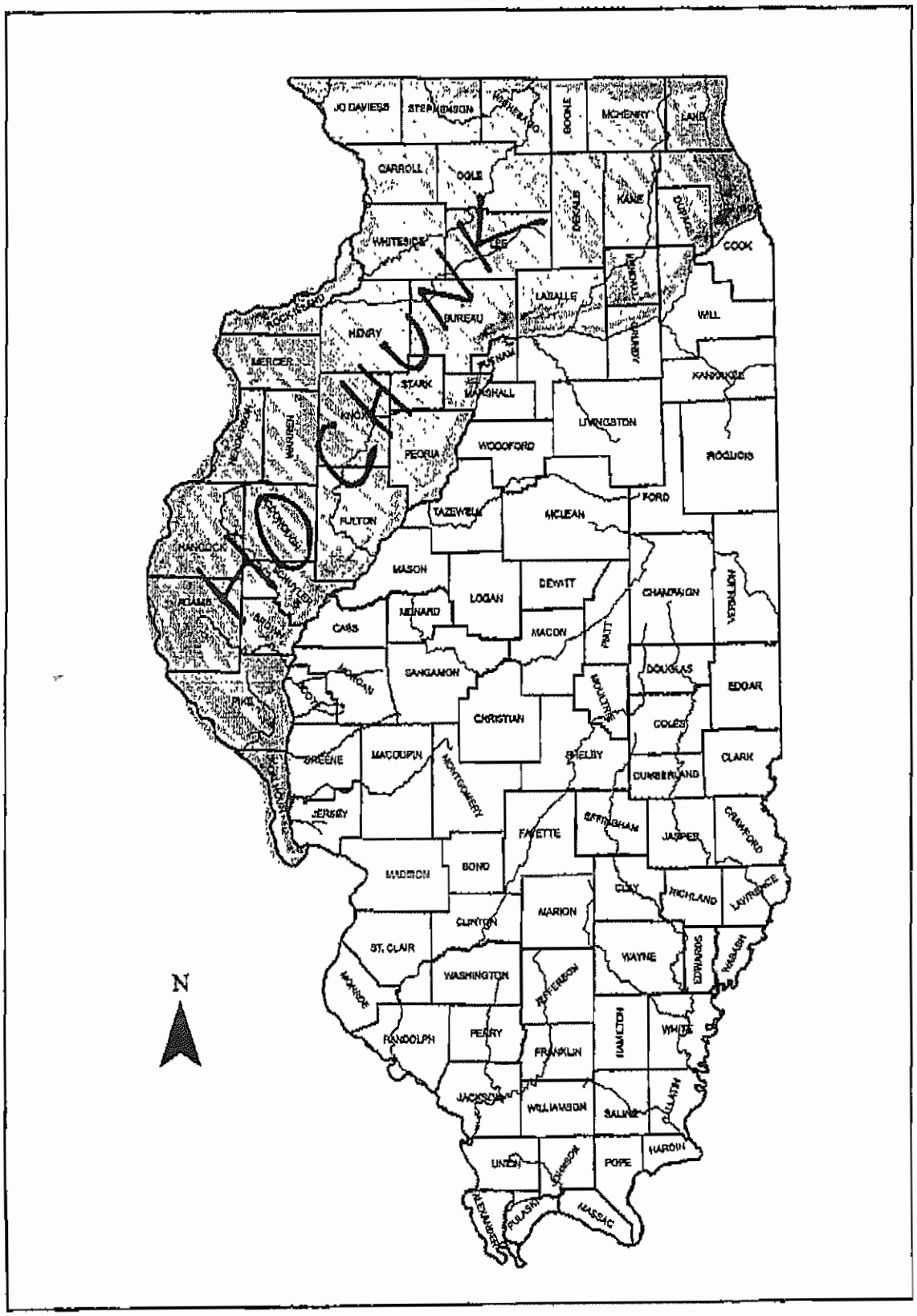
PONCA TRIBE OF NEBRASKA



580 267-2552
1-866-404-5297
cdouglas@kawnation.com

KAW Nation
Crystal Douglas

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STEPHENSON
WINNEBAGO
BOONE
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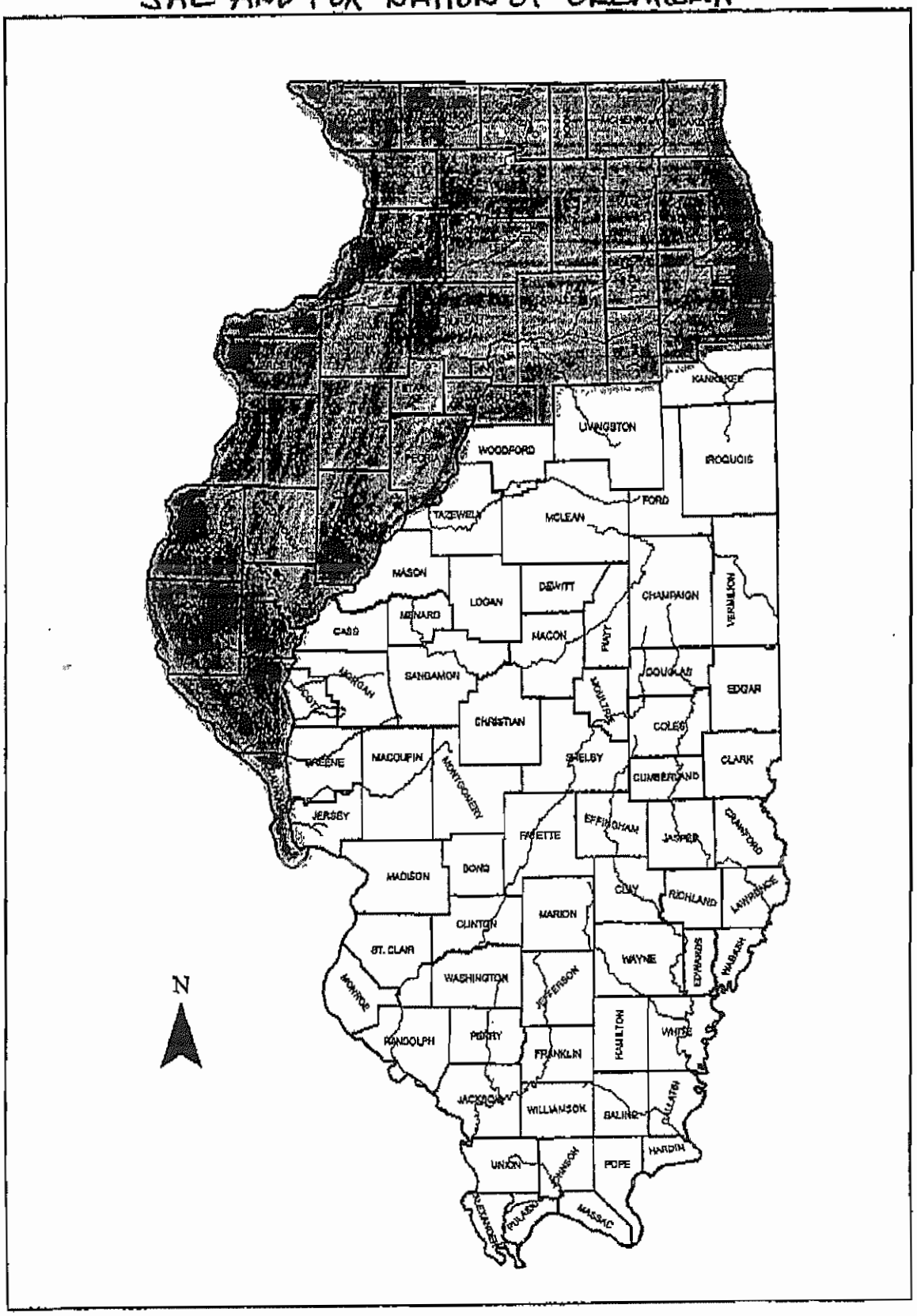
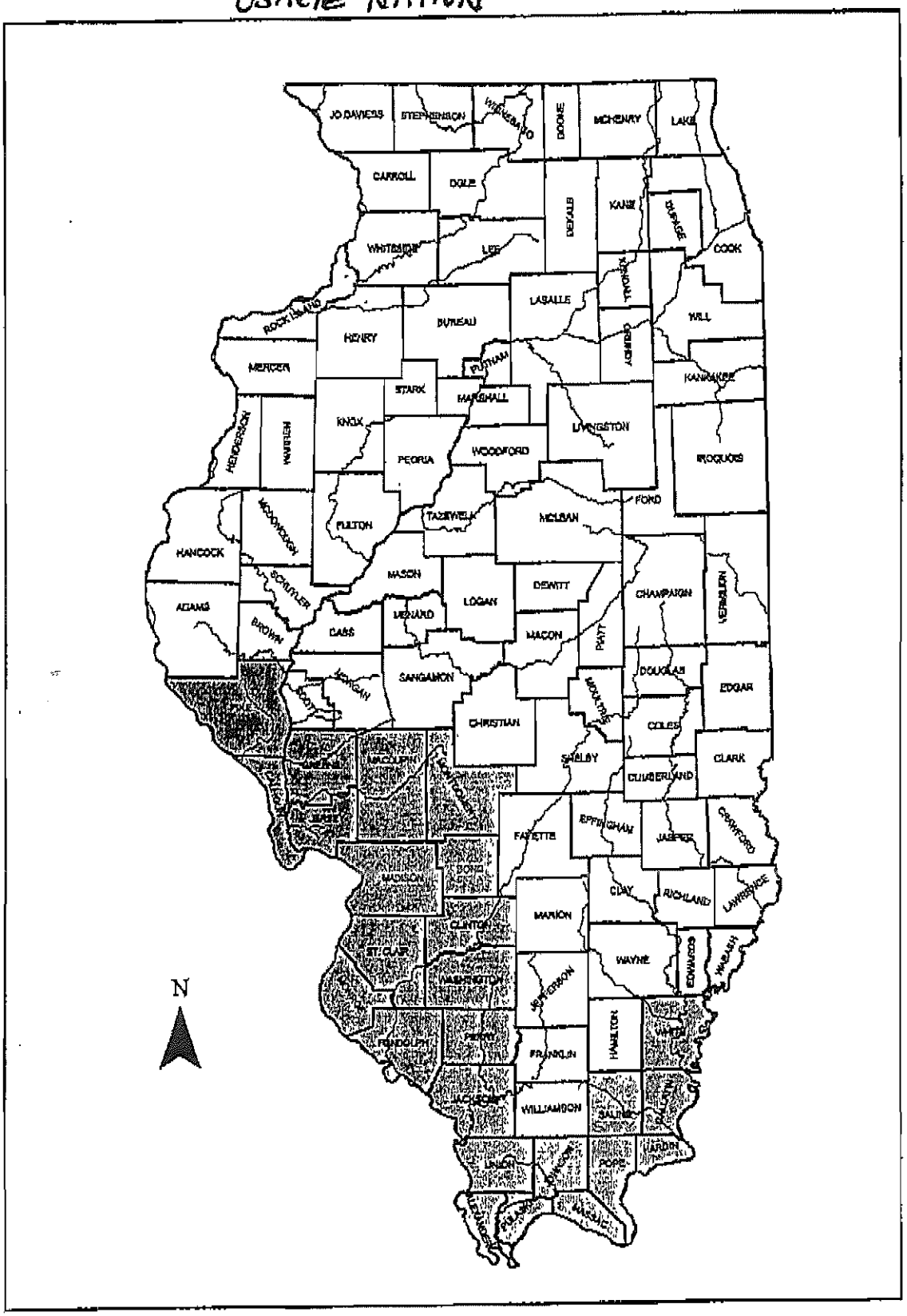
CARROLL
OGLE
DEKALB
KANE
DUPAGE
WHITESIDE
LEE
COOK
JOHNSON
LASALLE
BUREAU
GRUNDY
WILL
HENRY
MERCER
PUTNAM
STARK
MARSHALL
KANKAKEE
ROCK ISLAND
KNOX
WARREN
LIVINGSTON
PEORIA
WOODFORD
IROQUOIS
HANCOCK
FULTON
TAZEWELL
MCLEAN
FORD
CHAMPAIGN
MASON
LOGAN
DEWITT
VERMILION
MENARD
CASS
MACON
PIATT
SANGAMON
DOUGLAS
EDGAR
MORGAN
CHRISTIAN
MOULTRIE
COLES
GREENE
MACOUPIN
SHELBY
CLARK
CUMBERLAND
MONTGOMERY
JERSEY
EFFINGHAM
JASPER
CRAWFORD
FAYETTE
MADISON
BOND
CLAY
RICHLAND
LAWRENCE
CLINTON
MARION
ST. CLAIR
WAYNE
EDWARDS
WABASH
WASHINGTON
JEFFERSON
MONROE
RANDOLPH
PERRY
FRANKLIN
HAMILTON
WHITE
JACKSON
WILLIAMSON
SALINE
GALLATIN
UNION
JOHNSON
POPE
HARDIN
ALEXANDER
PULASKI
MASSAC
N

SAC AND FOX NATION OF OKLAHOMA



OSAGE NATION



APPENDIX D: ANALYSIS and SUPPORTING DOCUMENTATION

Attachment D-7: On Campus Bird Surveys

Heartland Community College prairie, nonnative grassland, and pond
June 14, 2008; 6:50 am-8:20 am
clear, mid-60s to mid-70s; pond high; construction road through entire north side and northwest quadrant
observer: Angelo Capparella

Canada Goose--21 (15 young, 6 adults)
Mallard--13 (7 young, 6 adults)
Ring-necked Pheasant--1
Great Blue Heron--1
Killdeer--1
Spotted Sandpiper--1
Rock Pigeon--2
Mourning Dove--3
Chimney Swift--2
Purple Martin--1
Barn Swallow--6
American Robin--3
European Starling--12
Common Yellowthroat--1
Song Sparrow--2
Red-winged Blackbird--53
Eastern Meadowlark--7
House Sparrow--3

18 species

Heartland Community College prairie, nonnative grassland, and pond
July 1, 2007; 6:55 am-8:20 am
breezy, mostly sunny, 57-68 degrees
observer: Angelo Capparella

Canada Goose--34 (includes young)
Mallard--17 (includes young)
Great Blue Heron--1
Killdeer--8
Spotted Sandpiper--2 (1 adult, 1 young)
Pectoral Sandpiper--1
Peep shorebird species--1
Rock Pigeon--1
Mourning Dove--2
Chimney Swift--1
American Crow--1
Tree Swallow--3

Northern Rough-winged Swallow--1
Barn Swallow--2
American Robin--2
Common Yellowthroat--1
Song Sparrow--4
Dickcissel--5
Red-winged Blackbird--66
Eastern Meadowlark--5
Common Grackle--2
American Goldfinch--4
House Sparrow--4

23 species

Heartland Community College prairie, nonnative grassland, and pond
June 25, 2006; 6:15 am-7:15 am
calm winds, partly cloudy, lower 70s
observer: Angelo Capparella

Canada Goose--ca 20 (includes young)
Mallard--ca 40 (includes young)
Great Blue Heron--1
Red-tailed Hawk--1
Killdeer--6
Spotted Sandpiper--2
Chimney Swift--1
Barn Swallow--2
Common Yellowthroat--1
Song Sparrow--5
Dickcissel--5
Red-winged Blackbird--very many
Eastern Meadowlark--4
House Sparrow--4

14 species

Site	Date	Mallard	Northern Shoveler	Green-Winged Teal	Blue-Winged Teal	Redhead	Ring-Necked	Lesser Scaup	Bufflehead	Wood Duck	Hooded Merganser	Common Goldeneye	Canada Goose (large)	White-Fronted Goose	Coot	Goslings	Mallard (ducklings)	Blue-Winged Teal (Ducklings)
Heartland	3/9/2009	32	0	1	0	6	12	1	0	0	0	2	98	0	0			
	3/16/2009	12	1	0	0	52	0	0	4	0	0	0	65	1	4			
	4/2/2009	10	0	0	0	16	0	0	0	0	0	0	21	0	5			
	4/15/2009	10	0	0	0	10	0	0	0	0	0	0	20	0	6			
	5/7/2009	3	0	0	0	0	1	0	0	0	0	0	10	0	4			
	5/29/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**67**	**1**	**1**	**0**	**84**	**13**	**1**	**4**	**0**	**0**	**2**	**214**	**1**	**19**			
Tipton	3/9/2009	6	0	0	0	0	0	0	0	0	0	0	0	0	0			
	3/16/2009	2	0	0	0	0	0	0	0	0	0	0	0	0	2			
	4/2/2009	2	0	0	0	0	0	0	0	0	0	0	0	0	17			
	4/15/2009	0	0	0	0	0	0	0	0	0	0	0	3	0	20			
	5/7/2009	2	0	0	0	0	0	0	0	0	0	0	0	0	2			
	5/29/2009	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**41**			
Water Trt	3/9/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	3/16/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/2/2009	2	0	0	5	0	0	0	0	5	0	0	0	0	0			
	4/15/2009	0	5	0	12	0	0	0	0	0	2	0	0	0	0			
	5/7/2009	3	0	0	6	0	0	0	0	0	0	0	0	0	0			
	5/29/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**5**	**5**	**0**	**23**	**0**	**0**	**0**	**0**	**5**	**2**	**0**	**2**	**0**	**0**			
Franklin E	3/9/2009	4	0	0	0	0	0	0	0	3	0	0	0	0	0			
	3/16/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/2/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/15/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	5/7/2009	0	0	0	4	0	0	0	0	0	0	0	2	0	0			
	5/29/2009	4	0	0	2	0	0	0	0	0	0	0	0	0	0			
Sum		**8**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**4**	**0**	**0**			
Franklin W	3/9/2009	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
	3/16/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	4/2/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	4/15/2009	0	0	0	2	0	0	0	0	0	0	0	2	0	0			
	5/7/2009	1	0	0	2	0	0	0	0	0	0	0	4	0	0	2		
	5/29/2009	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**4**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**			
Franklin G	3/9/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	3/16/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/2/2009	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/15/2009	0	0	0	20	0	0	0	0	0	0	0	0	0	0			
	5/7/2009	0	0	0	20	0	0	0	0	0	0	0	0	0	0			
	5/29/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**2**	**0**	**0**	**40**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**			
Floodplain E	3/9/2009	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
	3/16/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/2/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	4/15/2009	0	0	0	7	0	0	0	0	0	0	0	2	0	0			
	5/7/2009	3	0	0	4	0	0	0	0	0	0	0	0	0	0			
	5/29/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**5**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**			
Floodplain W	3/9/2009	12	0	1	0	0	10	0	0	0	0	0	5	0	0			
	3/16/2009	8	0	0	0	0	0	0	0	0	0	0	0	0	0			
	4/2/2009	0	0	2	0	0	0	0	0	0	0	0	0	0	0			
	4/15/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	5/7/2009	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
	5/29/2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sum		**20**	**0**	**3**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**			

Species	Heartland	Tipton Trails	Bloomington Water Treatment	Floodplain East	Floodplain West	Gully	West	East	Complex Total
Mallard	67	13	5	5	20	2	4	8	14
Northern Shoveler	1	0	5	0	0	0	0	0	0
Green-Winged Teal	1	0	0	0	3	0	0	0	0
Blue-Winged Teal	0	0	23	11	0	40	4	6	50
Redhead	84	0	0	0	0	0	0	0	0
Ring-Necked	13	0	0	0	10	0	0	0	0
Lesser Scaup	1	0	0	0	0	0	0	0	0
Bufflehead	4	0	0	0	0	0	0	0	0
Wood Duck	0	0	5	0	0	0	0	3	3
Hooded Merganser	0	0	2	0	0	0	0	0	0
Common Goldeneye	2	0	0	0	0	0	0	0	0
Canada Goose (large)	214	3	2	4	9	2	10	4	16
White-Fronted Goose	1	0	0	0	0	0	0	0	0
Coot	19	41	0	0	0	0	0	0	0
Goslings	12						6		
Mallard (ducklings)		3							
Blue-Winged Teal (ducklings)								3	

APPENDIX E: PUBLIC COMMENTS and RESPONSES

Heartland Community College Draft Environmental Assessment
Comments and Responses

Number	Commenter	Comments Received	Comment Summary	Response
1	Jonathan L Casebeer Chief Environmental Branch Department of Military Affairs	10/4/2010	Document was thorough and concise. Requested copy of appendices (subsequently provided via e-mail)	Thank you for your comment. Your comments are appreciated.
2a	Angelo Capparella JWP Audubon Society	10/6/2010	The use of a tubular tower, minimum FAA lighting, etc. are in fact standard practices for all turbines for reasons not necessarily linked to the reduction of wildlife fatalities. The only likely effective mitigation for bats is to curtail turbines by increasing the cut-in speed during periods of known heavy bat migration in our area (primarily during weather conditions favorable for migration during the period late August to October). [See Arnett et al. 2010, Effectiveness of Changing Wind Turbine Cut-in Speed to Reduce Bat Fatalities at Wind Facilities—Final Report (available at http://www.batsandwind.org)]. We would like to see this actual mitigation option recommended in the EA.	Both the use of monopole (tubular) supports and FAA minimum lighting requirements are referenced in the Interim Guidance on Avoiding and Minimizing Impacts to Wildlife from Wind Turbines as part of their Turbine Design and Operation recommendations (USFWS 2003). Heartland Community College will consider an increase in the turbine's cut-in speed after further evaluation of the specific turbine model chosen for the site.
2b	Angelo Capparella JWP Audubon Society	10/6/2010	We would like to see one year of monitoring for bat and bird mortality. The implementation of monitoring would serve three purposes: 1) determine to what extent there is mortality that may require mitigation, 2) provide a data source on wildlife mortality regarding a single turbine in an urban setting, and 3) be more consistent with the green image that HCC has been cultivating. Item 2 is especially interesting as my understanding is that there is little to no data on the effects of large urban turbines.	DOE and HCC recognize the benefit of post-construction avian and bat mortality monitoring for wind turbine projects. While neither USFWS, nor IDNR has required such monitoring, HCC has agreed to perform voluntary monitoring during the initial post-construction fall migration season (approximately 8-12 weeks, based predominantly on Indiana bat migration habits). The DOE is working with USFWS Region 3 to establish an appropriate protocol for post-construction monitoring for DOE funded single and small scale wind turbines in the Midwest. The final protocol is expected to include details related to timing, frequency, and reporting. HCC would implement monitoring consistent with the final protocol.
2c	Angelo Capparella JWP Audubon Society	10/6/2010	You are incorrect that there are no existing bird survey data for the project area. Dr. Angelo Capparella, ornithologist in the School of Biological Sciences at Illinois State University (ISU), did three summers (2006-2008) of single day breeding bird counts and the results were given to the President's office of HCC. We also have data from a graduate student at ISU on the waterfowl usage of the HCC pond in the project area as part of his on-going thesis.	The breeding bird counts (obtained during the summers of 2006-2008) and waterfowl counts as provided to John Jediny, DOE, via email on October 20, 2010 were reviewed. The breeding bird and waterfowl counts will be referenced in the Final EA.
2d	Angelo Capparella JWP Audubon Society	10/6/2010	You are incorrect that there are no bird viewing sites within the immediate vicinity of the project location. HCC has bird viewing sites on their campus: the pond, the 5-acre restored prairie, adjacent to the HCC habitat block (separated by a road), and associated greenspace.	Thank you for your comment. The information provided will be referenced in the Final EA. The pond, 5-acre restored prairie and associated green space will be referenced in the Final EA as locations from which birds can be viewed. Appendix A - Figure 5 will be revised to indicate the location of the 5-acre restored prairie.
2e	Angelo Capparella JWP Audubon Society	10/6/2010	You cite the Birding McLean County website as 2010 despite it stating that the last update was 14 August 2007. This was also before our local experts knew fully the significance of the pond for migrating waterfowl.	The reference to 2010 associated with the Birding McLean County website was intended to indicate that the website was accessed in 2010. The citation has been revised to reflect that the website was last updated on 14 August 2007. Additional reference was made to IDNR's online references to the best birding areas in the Illinois.
2f	Angelo Capparella JWP Audubon Society	10/6/2010	Data from the literature and from local wind farm surveys shows that three species of tree bats (Hoary, Red, and Silver-haired) migrate in large numbers over agricultural fields and towns in the Midwest, including McLean County. So it is very likely that HCC is in the migratory pathway of thousands of bats of these three species.	The EA references the possibility that suitable habitat for these three bat species may exist in the vicinity of the project area and that these species may have geographic distributions which may include the project area. The un-cited data referenced in item 6 of the comment letter (indicating that the Hoary, Eastern Red and Silver-haired bats migrate in large numbers over agricultural fields and towns including McLean County) will be incorporated into the Final EA.
2g	Angelo Capparella JWP Audubon Society	10/6/2010	Incorrect address was used in Appendix D (EA Stakeholder List) for our organization.	Thank you for your comment. The address has been corrected in final stakeholder list. The address referenced in Appendix D (EA Stakeholder List) for the organization will be updated as follows: John Wesley Powell Audubon Society, P.O. Box 142, Normal, IL 61761.
3	Lisa Bonnett Acting Deputy Director Illinois Environmental Protection Agency	10/21/2010 (After Close of Comment Period)	The Agency has no objections to the project. Acquisition of a NPDES permit is needed if more than one acre is disturbed during construction. Solid waste must be properly disposed of or recycled.	Thank you for your comment. The intent to obtain an NPDES permit is referenced multiple times throughout the EA. Waste management is also addressed in the EA and will be done in accordance with all in applicable Federal, State, and local regulations.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 • (217) 782-2829
James R. Thompson Center, 100 West Randolph, Suite 11-300, Chicago, IL 60601 • (312) 814-6026

PAT QUINN, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217-782-0547

October 21, 2010

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

Dear Mr. Jediny:

We have reviewed the information received on the proposed project for the Heartland Community College (HCC) Wind Energy Project in McLean County (Normal, Illinois).

The Agency has no objections to the project; however a construction site activity stormwater NPDES permit may be required from the Division of Water Pollution Control if one or more than one acre is disturbed during construction. For information concerning the NPDES permit, you may contact Al Keller, 217-782-0610.

Solid and hazardous waste must be properly disposed of or recycled.

Sincerely,

Lisa Bonnett
Acting Deputy Director

Rockford • 4302 N. Main St., Rockford, IL 61103 • (815) 987-7760
Elgin • 595 S. State, Elgin, IL 60123 • (847) 608-3131
Bureau of Land – Peoria • 7620 N. University St., Peoria, IL 61614 • (309) 693-5462
Collinsville • 2009 Mall Street, Collinsville, IL 62234 • (618) 346-5120
Des Plaines • 9511 W. Harrison St., Des Plaines, IL 60016 • (847) 294-4000
Peoria • 5415 N. University St., Peoria, IL 61614 • (309) 693-5463
Champaign • 2125 S. First St., Champaign, IL 61820 • (217) 278-5800
Marion • 2309 W. Main St., Suite 116, Marion, IL 62959 • (618) 993-7200

John Wesley Powell
Audubon Society

P.O. BOX 142 • NORMAL, ILLINOIS 61761

October 6, 2010

DOE Headquarters
c/o John Jediny (EE-3C)
1000 Independence Ave., SW
Washington, D.C. 20585

RE: draft EA for HCC Wind Energy Project

Dear Mr. Jediny:

I am writing as Conservation Chair for the John Wesley Powell Audubon Chapter in McLean County to provide comments on the draft Environmental Assessment (EA) for the 1.5 megawatt wind turbine on the Heartland Community College (HCC) campus in Normal, McLean County, Illinois. We are an official chapter of the National Audubon Society and an affiliate chapter of the Illinois Audubon Society. We are concerned about our local wildlife and ecosystems.

Our concern about the EA is that the wildlife/biological resources sections (2.5.1 and 3.2.2.6) were done without any input of local knowledge, thereby leading to a perfunctory analysis with mistakes and incomplete components. This weakens the reliability and accuracy of the analysis, thereby calling into question the robustness of the bat and bird conclusions in terms of impacts and adequate mitigation.

1. Reference is made (page 12) to the use of a tubular tower, minimum FAA lighting, etc as being mitigation components. Our understanding is that these are in fact standard practices for all turbines for reasons not necessarily linked to the reduction of wildlife fatalities. The only likely effective mitigation for bats is to curtail trubines by increasing the cut-in speed during periods of known heavy bat migration in our area (primarily during weather conditions favorable for migration during the period late August to October); see Arnett et al. 2010, Effectiveness of Changing Wind Turbine Cut-in Speed to Reduce Bat Fatalities at Wind Facilities—Final Report (available at http://www.batsandwind.org). We would like to see this actual mitigation option recommended in the EA.

2. No mention is made (page 12) about the prospects for monitoring the tower to assess, with real information instead of speculation, whether there is a mortality issue or not. We would like to see one year of monitoring for bat and bird mortality. This is an educational institution and the implementation of monitoring would serve three purposes: 1) determine to what extent there is mortality that may require mitigation, 2) provide a data source on wildlife mortality regarding a single turbine in an urban setting, and 3) be more consistent with the green image that HCC has

been cultivating. Item 2 is especially interesting as my understanding is that there is little to no data on the effects of large urban turbines.

3. You are incorrect (page 32) that there are no existing bird survey data for the project area. Dr. Angelo Capparella, ornithologist in the School of Biological Sciences at Illinois State University (ISU), did three summers (2006-2008) of single day breeding bird counts and the results were given to the President's office of HCC. Dr. Capparella is also Curator of Birds and Mammals (with US FWS and IDNR permits), and is a US FWS volunteer doing an official dove count route (#570) and an official BBS route (#34-029) outside of the turbine site area. We also have data from a graduate student at ISU on the waterfowl usage of the HCC pond in the project area as part of his on-going thesis. In our experience, it is a regrettable regular occurrence that federal and state agencies do not consult with local experts in universities and conservation groups.

4. You are incorrect (page 32) that there are no bird viewing sites within the immediate vicinity of the project location. HCC has bird viewing sites on their campus: the pond, the 5-acre restored prairie, and associated greenspace. The pond has been the subject of IDNR assistance over the years to improve its habitat features using taxpayer dollars. The 5-acre prairie was restored through the hard work of HCC and ISU students and faculty. This complex of habitat has been used regularly for public bird walks; for example, during the Autumnal Festival held by the ISU Horticulture Department. Finally, there is additional restored prairie at this ISU Horticulture facility which is adjacent to the HCC habitat block (separated by a road). Did any wildlife expert associated with this EA actually visit the project area?

5. You cite (page 32) the Birding McLean County website as 2010 despite it stating that the last update was 14 August 2007. This was also before our local experts knew fully the significance of the pond for migrating waterfowl.

6. You are incorrect (page 33) that the lack of roosting habitat for bats means that there will be no significant number of bats present. Data from the literature and from local wind farm surveys shows that three species of tree bats (Hoary, Red, and Silver-haired) migrate in large numbers over agricultural fields and towns in the Midwest, including McLean County. So it is very likely that HCC is in the migratory pathway of thousands of bats of these three species.

7. Please note that the incorrect address was used in Appendix D (EA Stakeholder List) for our organization. The correct address is: John Wesley Powell Audubon Society, P.O. Box 142, Normal, IL 61761.

We thank the DOE for the opportunity to submit these comments and look forward to your responses.

Sincerely,

Angelo Capparella

Angelo Capparella
Conservation Chairperson
John Wesley Powell Audubon Society

From: Casebeer, Jonathan Mr Facilities
To: Jediny, John;
cc: Hubbard, Jim; Ferro, James;
Subject: RE: Heartland Community College- Wind Energy Project (UNCLASSIFIED)
Date: Monday, October 04, 2010 12:43:51 PM

Classification: UNCLASSIFIED
Caveats: NONE

John

I have reviewed the document, it was through and concise except this document seems to be missing the supporting documentation Appendix A-D. Please send me
these if you can, especially appendix A & B. Since the land would be leased to us it would not be subject to the noise rules going from class A to Class B lands.

Section 901.103 Sound Emitted to Class B Land

Thank you

Jonathan L Casebeer
Mr. Jonathan L Casebeer
Chief Environmental Branch
Department of Military Affairs
1301 North MacArthur Blvd.
Springfield IL, 62702
Com (217) 761-3794
DSN 555-3794
Fax (217) 761-3790

-----Original Message-----
From: Jediny, John [mailto:John.Jediny@ee.doe.gov]
Sent: Friday, October 01, 2010 3:39 PM
To: Casebeer, Jonathan Mr Facilities
Cc: 'Hubbard, Jim'; Ferro, James
Subject: Heartland Community College- Wind Energy Project

Hi John,

I wanted to personally invite you to review the Draft Environmental Assessment prepared for Heartland CC's proposed wind turbine. If you would like (though not necessary) you can provide any comments you may have directly to me. If you would like further clarification or if you have any questions please feel free to contact me directly, my information is below.

Thank you and have a great weekend,

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

[cid:921093420@01102010-317A]

Classification: UNCLASSIFIED
Caveats: NONE