

APPENDIX A

Environmental Assessment Scoping

Company	Title	Department	Last	First	Agency	Address Line 1	Address Line 2	City	email	Phone	State	Zip Code	Phone
U.S. Fish and Wildlife Service	Field Supervisor	USFWS Rock Island Field Office	Nelson	Richard		1511 47th Avenue		Moline			IL	61265	
U.S. Army Corps of Engineers	Chief, Enforcement Section	Regulatory Branch	Jones	Donna		Clock Tower Building	Post Office Box 2004	Rock Island			IL	61204-2004	
U.S. Army Corps of Engineers	POC for this action	Regulatory Branch	Frolich	Albert		Clock Tower Building	Post Office Box 2004	Rock Island			IL	61204-2004	309-794-5659
Iowa Department of Natural Resources		Water Resources Section	Schwake	Chris		Wallace Office Building	502 E 9th St.	Des Moines			IA	50319-0034	
Iowa Department of Natural Resources		Conservation and Recreation Division					502 E 9th St.	Des Moines			IA	50319-0034	
Federal Aviation Administration	POC for this action	Federal Aviation Administration	Blaich	Michael		Air Traffic Airspace Branch, ASW-520	2601 Meacham Blvd	Fort Worth			TX	76137-0520	
Federal Aviation Administration		Obstruction Evaluation Service	Edgett-Baron	Sheri		Air Traffic Airspace Branch, ASW-520	2601 Meacham Blvd	Fort Worth			TX	76137-0520	
State Historical Society of Iowa		Architectural Historian	Ammerman	Jeremy		600 East Locust Street		Des Moines			IA	50319-0290	515-281-5111
Office of the State Archaeologist						700 Clinton St. Bldg		Iowa City			IA	52242-1030	319-384-0732
U.S. Environmental Protection Agency	NEPA Coordination Team Leader	EPA Region 7	Cothorn	Joe			901 North Fifth Street	Kansas City			KA	66101	913-551-7148
U.S. Department of the Interior, Regional Office	Regional Environmental Officer		Stewart	Robert		P.O. Box 25007 (D-108)	Denver Federal Center	Denver			CO	80225-0007	303-445-2500
U.S. Department of the Interior, Bureau of Indian Affairs			Keller	Marvin		2051 Mercator Drive	Room 247	Reston			VA	20191	703-390-6325
Iowa Department of Natural Resources	Director		Leopold	Richard		Henry A. Wallace Building	502 East Ninth Street	Des Moines			IA	50319-0034	515-281-5385
Office of the Governor	Governor of Iowa		Culver	Chet		State Capital	1007 East Grand Avenue	Des Moines			IA	50319	515-281-5221
Federal Emergency Management Agency	Deputy Regional Environmental Officer		Sessa	Ken		DHS/FEMA Region VII	9221 Ward parkway, Suite 300	Kansas City			KA	64114	816-283-7960
Sac & Fox Tribe of the Mississippi in Iowa	Tribal Council Chief		Wanatee	Gailey		349 Meskwaki Rd		Tama			IA	52399	
Sac & Fox Tribe of the Mississippi in Iowa	Chairman		Pushetonequa	Adrian		349 Meskwaki Road		Tama			IA	52339-9629	641-484-4678
Kirkwood Community College	Executive Director Facilities	Kirkwood Wind Turbine Project	Kaldenberg	Thomas		6301 Kirkwood Blvd. SW		Cedar Rapids			IA	52404	319-398-5569
Kirkwood Community College	Director, Public Information		Carpenter	Steve		6301 Kirkwood Blvd. SW		Cedar Rapids			IA	52404	319-398-4939
Howard R. Green Company	Project Scientist		McCasin	Ted		2550 University Ave W, STE 400N		St. Paul			MN	55114	651-659-7708
Howard R. Green Company			Fisher	Mike		2550 University Ave W, STE 400N		St. Paul			MN	55114	319-841-4354
National Audubon Society	Vice President		Wallis	Phil		1201 Pawlings Road		Audubon			PA	19403	
National Audubon Society	General Counsel		Scott	Michelle		225 Varick Street, 7th floor		New York			NY	10014	
National Audubon Society	Important Bird Area Coordinator and Staff Biologist		Van Fleet	Kim		100 Wildwood Way		Harrisburg			PA	17110	
Meyer Glitzenstein & Crystal			Glitzenstein	Eric		1601 Connecticut Ave., N.W.	Suite 700	Washington			DC	20009-1056	
Meyer Glitzenstein & Crystal			Eubanks	William		1601 Connecticut Ave., N.W.	Suite 701	Washington			DC	20009-1057	
Kirkwood Estates Trailer Park	Manager					615 Miller Avenue Drive SW		Cedar Rapids			IA	52404	
Kirkwood Courts Apartments	Manager					205 Kirkwood Ct. SW		Cedar Rapids			IA	52404	
Campus View Apartments	Manager					205 Kirkwood Ct. SW		Cedar Rapids			IA	52404	
Eagle's Pointe at Kirkwood	Manager					5502 Kirkwood Blvd SW		Cedar Rapids			IA	52404	
Kirkwood Kids Child Development Center		Kirkwood Community College				6301 Kirkwood Blvd. SW		Cedar Rapids			IA	52404	
City of Cedar Rapids	Mayor		Corbett	Ron		321 30th Street SE		Cedar Rapids			IA	52404	319-286-5051
City of Cedar Rapids	Public Works Director/City Engineer		Elgin	David		Public Works Building	1201 6th St SW	Cedar Rapids			IA	52404	319-286-5802



STATE OF IOWA

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
PATRICIA L. BODDY, INTERIM DIRECTOR

October 25, 2010

Ms. Melissa Rossiter
NEPA Document Manager
Department of Energy
1617 Cole Boulevard
Golden, CO 80401

Subject: Kirkwood Community College's Proposed Wind Turbine Project

Dear Ms. Rossiter:

This letter is in response to your October 13, 2010 letter concerning the proposed wind turbine at Kirkwood Community College in Cedar Rapids, Iowa. A letter dated July 16, 2010, from the Iowa Department of Natural Resources Conservation and Recreation Division, was sent to Mr. Ted McCaslin of Howard R. Green Company discussing this project. I've attached a copy of that letter.

Waters of the United States (includes wetlands) should not be disturbed if a less environmentally damaging alternative exists. Unavoidable adverse impacts should be minimized to the extent practicable. Any remaining adverse impacts should be compensated for through restoration, enhancement, creation and/or preservation activities. We would ask that Best Management Practices be used to control erosion and protect water quality near the project.

Any proposed placement of dredged or fill material into waters of the United States (including jurisdictional wetlands) requires Department of the Army authorization. When detailed plans are available, please complete and submit the joint application form to the Rock Island District Corps of Engineers (1 copy) and Iowa Department of Natural Resources (2 copies) for processing. The application form may be obtained at <http://www.iowadnr.gov/other/files/jointpermit.pdf>.

If you have any questions, please call me at 515-281-6615.

Sincerely,

A handwritten signature in blue ink that reads "Christine M. Schwake".

Christine Schwake
Environmental Specialist

Attachment



STATE OF IOWA

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
RICHARD A. LEOPOLD, DIRECTOR

July 16, 2010

Mr. Ted McCaslin
Howard R. Green Company
Court International Building
2550 University Ave. West
Suite 400N
St. Paul, MN 55114

RE: Environmental Review for Natural Resources
Wind Turbine Kirkwood Community College
Linn County
Section 15, Township 82N, Range 7W

Dear Mr. McCaslin:

Thank you for inviting Department comment on the impact of this project. Although the Department does not regulate wind farms, if relatively frequent bird and bat mortality is discovered at the turbine site, please contact the Department for further consultation as it is in the developer's interest to avoid potential conflict with federal and state-listed threatened and endangered species. The college should consider conducting spring and fall bird and bat mortality surveys. This work could be done by students as a learning experience and will add to the information concerning wildlife migration in Iowa. Information titled *Wind Energy and Wildlife Resource Management in Iowa: Avoiding Potential Conflicts* is here as an attachment and is available from the Department website at:

http://www.iowadnr.gov/wildlife/diversity/files/wind_wildliferecs.pdf

The Department, together with the U.S. Fish and Wildlife Service, recommends that tubular turbine supports rather than lattice supports are used to minimize bird perching and nesting opportunities. Avoid placing external ladders and platforms on tubular towers to minimize perching and nesting. Avoid use of guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with recommended bird deterrent devices (Avian Power Line Interaction Committee 1994).

This letter is a record of review for protected species, rare natural communities, state lands and waters in the project area, including review by personnel representing state parks, preserves, recreation areas, fisheries and wildlife but does not include comment from the Environmental Services Division of this Department. This letter does not constitute a permit. Other permits may be required from the Department or other state or federal agencies before work begins on this project.

Any construction activity that bares the soil of an area greater than or equal to one acre including clearing, grading or excavation may require a storm water discharge permit from the Department. Construction activities may include the temporary or permanent storage of dredge material. For more information regarding this matter, please contact Ruth Rosdail at (515) 281-6782.

The Department administers regulations that pertain to fugitive dust IAW Iowa Administrative Code 567-23.3(2)"c." All persons shall take reasonable precautions to prevent the discharge of visible emissions of

fugitive dusts beyond the lot line of property during construction, alteration, repairing or demolishing of buildings, bridges or other vertical structures or haul roads. All questions regarding fugitive dust regulations should be directed to Jim McGraw at (515) 242-5167.

If you have questions about this letter or require further information, please contact me at (515) 281-8524.

Sincerely,

Original signed by

Daryl Howell
Environmental Specialist
Conservation and Recreation Division

FILE COPY: Kelly Poole

Tracking Number: 5048

Enclosures

Suggested References

Anderson, R., M. Morrison, K. Sinclair, D. Strickland, H. Davis, and W. Kendall. 1999. Studying wind energy/bird interactions: a guidance document. Metrics and methods for determining or monitoring potential impacts on birds at existing and proposed wind energy sites. Avian Subcommittee, National Wind Coordinating Committee, Washington, DC. 87 pp.

Jain, A.A. 2005. Bird and bat behavior and mortality at a northern Iowa windfarm. M.S. Thesis, Iowa State Univ., Ames. 108pp.

A - 3 email - 102010-Iowa State Archeologist - update to this maybe coming.txt
From: "Rossiter, Melissa" <melissa.rossiter@go.doe.gov>
To: "Richard Holder" <rholder@jason.com>
Subject: FW: EA -- Kirkwood Community College wind turbine project, Linn Co., IA
Date: Wednesday, October 20, 2010 7:58 AM

FYI

Melissa H. Rossiter
Telephone 720.356.1566
Blackberry 720.291.1602
melissa.rossiter@go.doe.gov

-----Original Message-----

From: Doershuk, John F [mailto:john-doershuk@uiowa.edu]
Sent: Wednesday, October 20, 2010 9:51 AM
To: Rossiter, Melissa
Subject: EA -- Kirkwood Community College wind turbine project, Linn Co., IA

Melissa:

My office is in receipt of the postcard notification re input on the Kirkwood Community College wind turbine project, Linn Co., IA. Please send me the area of potential effect for the project and I will check our records for 1) known archaeological resources that might be affected and 2) the potential for the project area to contain currently unrecorded archaeological resources of significance. Receipt of project map data as an e-mail attachment preferred.

Thank you,

John F. Doershuk, Ph.D.
State Archaeologist

**Proposed Wind Turbine
Kirkwood Community College, Cedar Rapids, Iowa
Public Information Meeting
December 7, 2010**

Purpose of the Public Information Meeting:

The purpose of this meeting is to discuss Kirkwood Community College's proposal to construct a wind turbine on the College's main campus in Cedar Rapids, Iowa.

Proposed Project:

Kirkwood Community College, with funding support from the Department of Energy and the Iowa Office of Energy Independence, is proposing to install a 2.5 megawatt wind turbine on the College's main campus in Cedar Rapids, Iowa. The proposed wind turbine would supply power directly to Alliant Energy's distribution system.

The turbine would serve as the focal point for workforce development and continuing education programs that would foster employment and technical expertise in Iowa's evolving green economy. The proposed wind turbine would also be accessible as a tool for renewable energy-based educational programs that currently exist and are being developed at other Iowa community colleges.



Computer generated rendition of proposed location, looking south.

Proposed Wind Turbine:

The proposed wind turbine would be located near Kirkwood Community College's baseball complex on central campus in Cedar Rapids, Iowa. The wind turbine would be American made with a hub mechanism approximately 260 feet (80 meters) tall and rotors (the turbine's blades) approximately 160 feet (50 meters) long. With a rotor turning directly above the hub the turbine would be a total of approximately 430 feet (130 meters) tall.

Funding Sources:

Kirkwood has received an Iowa Office of Energy Independence State Energy Program grant of \$1,050,000 to help fund the project. Kirkwood has also applied for funding assistance from the Iowa Energy Center Alternative Energy Revolving Loan Program.

Environmental Studies & Agency Coordination:

The Department of Energy, the federal agency responsible for funding the State Energy Program, is currently conducting an Environmental Assessment (EA) study for the proposed project. The EA will evaluate how the proposed wind turbine would impact the natural and human environment within the project study area. As part of the EA, a detailed noise analysis and shadow flicker study are being conducted to understand how the proposed turbine would affect the area around the proposed location.

Preliminary coordination has occurred with some federal and state agencies including the Federal Aviation Administration, U.S. Fish and Wildlife, Army Corps of Engineers, Iowa Department of Natural Resources, and State Historical Society of Iowa.



Computer generated rendition of proposed location, looking north.

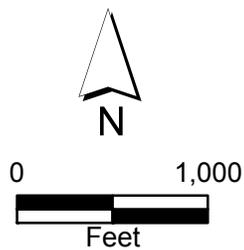
For More Information Please Contact:

Mr. Thomas Kaldenberg
Executive Director of Facilities
Kirkwood Community College
6301 Kirkwood Blvd SW, Cedar Rapids, IA 52406
Telephone: (319) 398-5569
Email: thomas.kaldenberg@kirkwood.edu



LOCATION MAP

**Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa**



 Proposed Turbine Location

View: Looking northeast from the Community Training & Response Center Building

Windfarm information
Created by:
Howard R. Green Company
8710 Earhar Lane SW
US-CEDAR RAPIDS, IA 52409
Exported from WindPRO
<http://www.WindPRO.com>



View: Looking northwest from Kirkwood Facilities Building

Windfarm information
Created by:
Howard R. Green Company
8710 Earhar Lane SW
US-CEDAR RAPIDS, IA 52409
Exported from WindPRO
<http://www.WindPRO.com>



POSSIBLE VISUAL APPEARANCE

**Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa**

**Computer Generated Images
WindPRO Software**



View: Looking north from Jones Hall

Windfarm information
Created by:
Howard R. Green Company
8710 Earhar Lane SW
US-CEDAR RAPIDS, IA 52409
Exported from WindPRO
<http://www.WindPRO.com>



View: Looking northeast from Kirkwood Hall

Windfarm information
Created by:
Howard R. Green Company
8710 Earhar Lane SW
US-CEDAR RAPIDS, IA 52409
Exported from WindPRO
<http://www.WindPRO.com>



POSSIBLE VISUAL APPEARANCE

**Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa**

**Computer Generated Images
WindPRO Software**



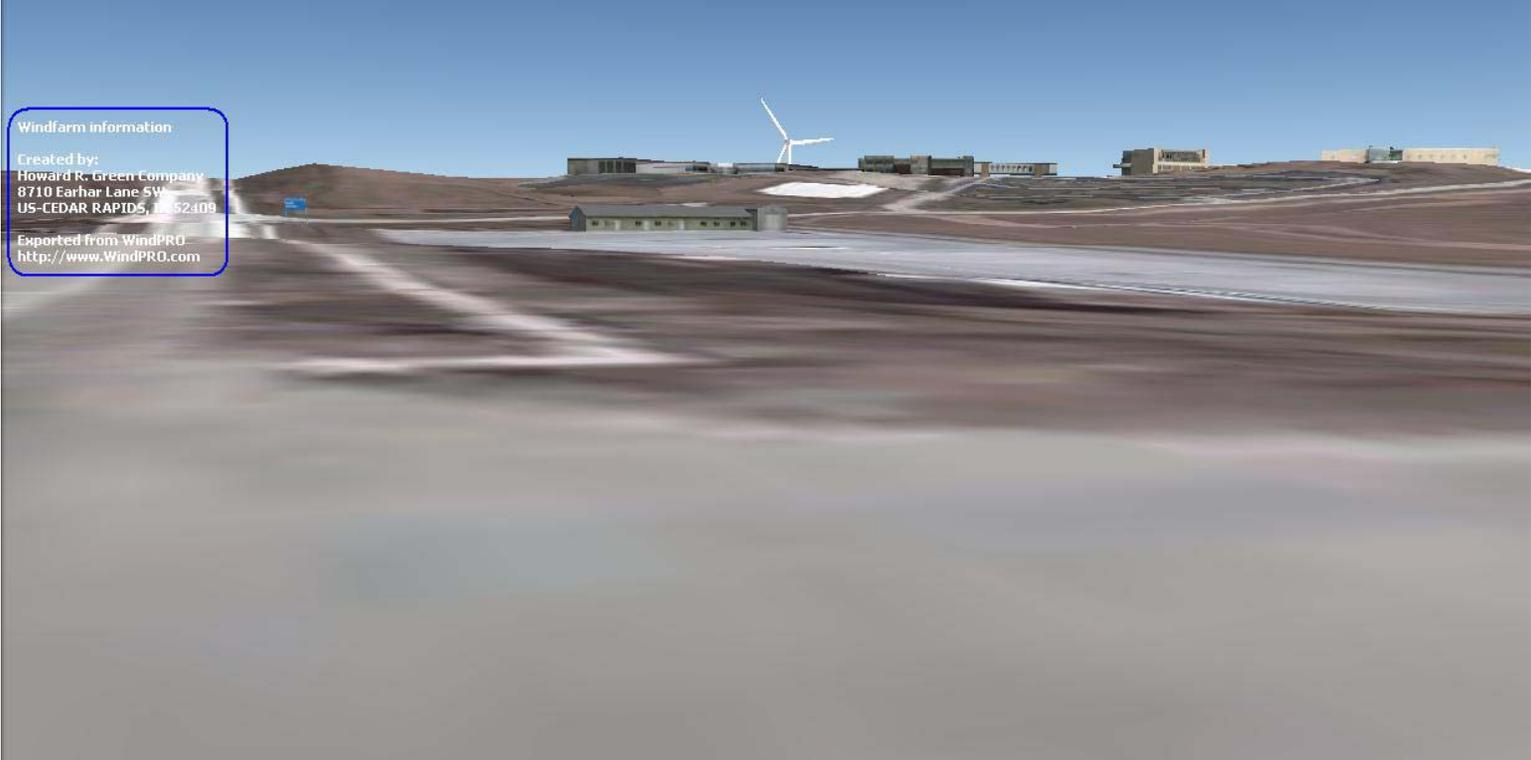
View: Looking southeast from the Kirkwood Boulevard North Entrance

Windfarm information
Created by:
Howard R. Green Company
8710 Earhar Lane SW
US-CEDAR RAPIDS, IA 52409
Exported from WindPRO
<http://www.WindPRO.com>



View: Looking northeast from the southwest side of Campus on Kirkwood Boulevard

Windfarm information
Created by:
Howard R. Green Company
8710 Earhar Lane SW
US-CEDAR RAPIDS, IA 52409
Exported from WindPRO
<http://www.WindPRO.com>



POSSIBLE VISUAL APPEARANCE

**Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa**

**Computer Generated Images
WindPRO Software**





View: Looking east from Kirkwood Boulevard at the Main Entrance

Windfarm information
 Created by:
 Howard R. Green Company
 8710 Earlier Lane SW
 US-CEDAR RAPIDS, IA 52409
 Exported from WindPRO
<https://www.WindPRO.com>



View: Looking southeast from Kirkwood Boulevard & US 30 exit north of campus

POSSIBLE VISUAL APPEARANCE

**Proposed Wind Facility
 Kirkwood Community College
 Cedar Rapids, Iowa**

**Computer Generated Images
 Google Earth Software**



WELCOME

to the

**Kirkwood Community College
Proposed Wind Turbine**

Public Information Meeting

**December 7, 2010
Kirkwood Community College
Jones Hall, Room 108
4:00 PM to 6:00 PM**



COMMENTS

Your comments are important to us.

Please fill out the form and drop it in the comment box.

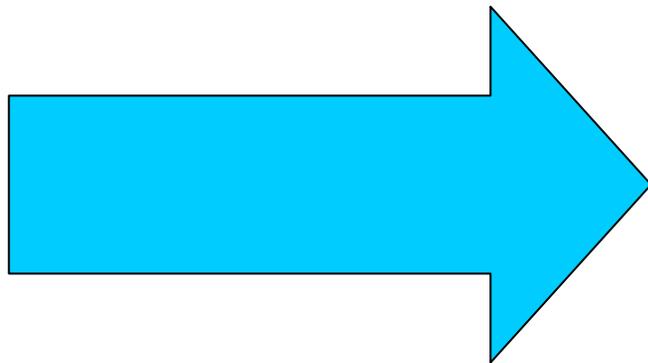


**Thank you
for Participating!**

Proposed Wind Turbine Public Information Meeting

**December 7, 2010
4:00 PM to 6:00 PM**

Room 108

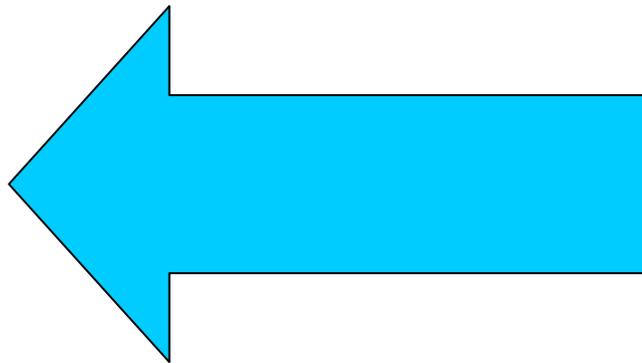


**Kirkwood Community College
Cedar Rapids, Iowa**

Proposed Wind Turbine Public Information Meeting

**December 7, 2010
4:00 PM to 6:00 PM**

Room 108



**Kirkwood Community College
Cedar Rapids, Iowa**

**Proposed Wind Turbine
Public Information Meeting**

**December 7, 2010
4:00 PM to 6:00 PM**

**Jones Hall
ROOM 108**

**Kirkwood Community College
Cedar Rapids, Iowa**

**Proposed Wind Turbine
Kirkwood Community College, Cedar Rapids, Iowa
Public Information Meeting
December 7, 2010**

SIGN IN FORM

First Name: _____ Last Name: _____
Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

First Name: _____ Last Name: _____
Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

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Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

First Name: _____ Last Name: _____
Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

THANK YOU FOR PARTICIPATING

Your comments are important to the success of this project. We will give careful consideration to all of the comments and information received as we continue with project development.

Mailing Instructions:

- Fold the form into thirds
- Tape the form shut so the address shows
- Stamp and mail the form

Fold Second

Howard R. Green Company
Attn: Stacy Woodson
P.O. Box 9009
Cedar Rapids, IA 52409-9009

Fold First

Subject:	Public Information Meeting
Project:	Kirkwood Community College Proposed Wind Turbine
Project Number:	10100015.01
Meeting Date:	4:00 – 6:00 PM, Tuesday, December 7, 2010
Meeting Location:	Kirkwood Community College, Jones Hall, Room 108
Notes by:	Mike Fisher, Ted McCaslin, Stacy Woodson

Attendees:

Kirkwood Community College
Dr. Mick Starcevich
Tom Kaldenberg
Iowa Office of Energy Independence
Jordan Vaughan
Howard R. Green Company
Mike Fisher
Ted McCaslin
Stacy Woodson
Public (see attached sign in sheet)
Leo Tonyan, 7212 Rolling Ridge Dr. SW, Cedar Rapids
Jim Off, 1223 40 th St. Court NW, Cedar Rapids
Christopher Brandt, 5943 Murfield Dr. SW #4, Cedar Rapids
Jorge Lopez, Kirkwood Community College
Sandy Bell, 5665 Cornell St. SW, Cedar Rapids

Notice of Meeting:

Meeting notification letters were mailed to approximately 1,700 residents around Kirkwood Community College. A public notice announcing the date, time, and location of the meeting was published in the Cedar Rapids Gazette on November 26-28, 2010. Email notification of the meeting was sent on November 30, 2010 to local, state, and federal agencies with special interest in the proposed project (i.e. Cedar Rapids Planning Department, Iowa Office of Energy Independence, and U.S. Department of Energy). See attached meeting notification correspondence.

Meeting Exhibits & Displays:

- Handout - Summary of Proposed Project
- Location Map of Proposed Wind Turbine
- Computer Generated Images - Possible Visual Appearances
 - Looking northeast from Community Training & Response Center Building
 - Looking northwest from Kirkwood Facilities Building
 - Looking north from Jones Hall
 - Looking northeast from Kirkwood Hall
 - Looking southeast from Kirkwood Blvd. north entrance
 - Looking northeast from the southwest side of campus on Kirkwood Blvd.
 - Looking east from Kirkwood Blvd. at the main entrance.
 - Looking southeast from Kirkwood Blvd. & US 30 exit north of campus

Summary of the Meeting:

The purpose of the meeting was to introduce the public to Kirkwood Community College's proposal to construct a 2.5 megawatt wind turbine on campus. The meeting was held in Room 108 of Jones Hall on Kirkwood's Campus.

The meeting began at 4:00 PM. Five people signed in. Of the five, two were Kirkwood Community College instructors that teach in Jones Hall. Some of the general questions that were asked by the attendees included:

- Where the proposed turbine would be located?
- When the proposed turbine would be constructed?
- How much noise the turbine would generate?
- What environmental studies are being done to protect species?
- Who is funding the project?
- Where will the generated power go?

Prior to the meeting Tom Kaldenberg received a few phone calls from the public asking questions about the location, cost of the proposed project, and if nearby residents energy costs or taxes would go down with the installation of the proposed project.

The meeting concluded at 6:00 PM. No written comments were received at the meeting.

Proposed Wind Turbine
Kirkwood Community College, Cedar Rapids, Iowa
Public Information Meeting
December 7, 2010

SIGN IN FORM

First Name: Leo Last Name: Tonyan
Mailing Address: 7212 Rolling Ridge Dr SW
City, State, Zip: Cedar Rapids IA 52404
Phone Number: 319-804-3003

First Name: Jim Last Name: OFF
Mailing Address: 1223 40th St Court NW
City, State, Zip: CEAR RAPIDS IA 52405
Phone Number: 319 398 5650

First Name: Christopher Last Name: Braucht
Mailing Address: 5943 Muirfield Dr SW #4
City, State, Zip: Cedar Rapids IA
Phone Number: 319-841-2218

First Name: Jorge Last Name: Lopez
Mailing Address: KIRKWOOD COMMUNITY COLLEGE
City, State, Zip: _____
Phone Number: 398-5422

First Name: Sandy Last Name: Bell
Mailing Address: 5665 Cornell St SW
City, State, Zip: CR
Phone Number: 365-6107

First Name: _____ Last Name: _____
Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

First Name: _____ Last Name: _____
Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

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Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

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Mailing Address: _____
City, State, Zip: _____
Phone Number: _____

First Name: _____ Last Name: _____
Mailing Address: _____
City, State, Zip: _____
Phone Number: _____



November 19, 2010

Re: Public Information Meeting - Kirkwood Community College Proposed Wind Turbine

Dear Current Resident:

On behalf of Kirkwood Community College, you are invited to attend a Public Information Meeting on:

Tuesday, December 7, 2010, between 4:00 and 6:00 PM
at Kirkwood Community College, Jones Hall, Room 108

The purpose of this meeting is to discuss Kirkwood Community College's proposal to construct a wind turbine on the College's main campus. No formal presentation will be made at the meeting. Staff from Kirkwood and HR Green will be available during this time to answer questions regarding the proposal.

Kirkwood Community College is working with the Department of Energy and the Iowa Office of Energy Independence on a proposal to install a 2.5 megawatt wind turbine on the College's main campus in Cedar Rapids, Iowa. The proposed wind turbine would supply power directly to Alliant Energy's distribution system. The turbine would serve as the focal point for workforce development and continuing education programs that would foster employment and technical expertise in Iowa's evolving green economy. The proposed wind turbine would also be accessible as a tool for renewable energy-based educational programs that currently exist and are being developed at other Iowa community colleges.

For more information regarding the proposal, please contact:

Mr. Thomas Kaldenberg, Executive Director of Facilities
Kirkwood Community College
6301 Kirkwood Blvd SW, Cedar Rapids, IA 52406
Telephone: (319) 398-5569
Email: thomas.kaldenberg@kirkwood.edu

Sincerely,

HOWARD R. GREEN COMPANY

Michael G. Fisher
Vice President

progress. innovation. expertise.

Public Notice:

Kirkwood Community College will hold a Public Information Meeting to discuss the proposal of constructing a 2.5 megawatt wind turbine on the College's main campus. The meeting will take place on:

Tuesday, December 7, 2010, 4:00 to 6:00 PM
Kirkwood Community College, Jones Hall, Room 108

Staff will be available to answer questions. No formal presentation will be made. For more information regarding the proposed project contact: Mr. Thomas Kaldenberg, Executive Director of Facilities, Kirkwood Community College, 6301 Kirkwood Blvd SW, Cedar Rapids, IA 52406, (319) 398-5569, thomas.kaldenberg@kirkwood.edu.

THE ACES ON BRIDGE

Bobby Wolff

"A man must be a little mad if he does not want to be even more stupid."

— Michel de Montaigne

On this deal from the first session of last year's Blue Ribbon Pairs, South, with eight tricks in his hand facing an opening bid, decided to eschew a scientific approach. It is better to play the direct four-no-trump response as asking for aces, but North and South were at least on the same wavelength. After discovering that his partner held the relevant key-cards, South took a shot at seven spades.

At first things were going smoothly, but then came a hitch: Nikolay Deatner (West) rejected the traditional (but perhaps over-rated) lead of a trump in favor of the club king. That appears to be a catastrophic decision when you look at all four hands as declarer can now ruff two clubs in dummy.

South took trick one with dummy's ace, cashed the top hearts, discarding a diamond, crossed to the diamond ace and ruffed a club. He now played the diamond queen, ruffing it in hand, and ruffed his last club.

He only had to get back to hand to draw trumps to hand his ambidextrous contract, and we can see that a diamond ruff is the way to do it. However, there was a problem, because on the second round of diamonds West had followed with the king!

That brilliant falsecard induced declarer to return to hand by ruffing a heart, which West was able to overruff. How much more satisfying than to lead a trump and defeat the contract in more pedestrian fashion.

NORTH 11-26-A
 ♠ A 3
 ♥ K 8 5 2
 ♦ Q J 9 8 4
 ♣ A

WEST
 ♠ 7 6 4
 ♥ K 10 6
 ♦ K Q 6 3 2
 ♣ K Q 6 3 2

SOUTH
 ♠ A K Q 10 7 6 2
 ♥ A 5
 ♦ A 5
 ♣ J 5 4

EAST
 ♠ 5
 ♥ Q J 10 4 3
 ♦ 7 3 2
 ♣ 10 9 8 7

Vulnerable: Both
 Dealer: North

The bidding:
 South West North East
 4NT Pass 1♥ Pass
 5NT Pass 5♠ Pass
 7♣ All pass
 7♠ or three key-cards counting the trump king as an ace

Opening lead: Club king

BID WITH THE ACES 11-26-B

South holds:

♠ J 8 4
 ♥ 7 6
 ♦ K 10 6
 ♣ K Q 6 3 2

South West North East
 1NT Pass 1♥ Pass
 1NT Pass 2♣ Pass

ANSWER: Your no-trump response suggested 8-12 points, so you are at the lower end of your range. But your trump support is outstanding. Not only might you make game, but you may not have much defense against a spade or diamond contract. I would raise to three clubs now, which does not promise the earth. (The "impossible" bid of two spades, or a cuebid of two hearts, would show a stronger hand.)

Trucks, sport utilities

AUTOLAND

06 Mercury Mariner Premier AWD.....\$11,995
 06 Ford Escape XLT, loaded 40K.....\$10,995
 05 Ford Escape XLT AWD V6.....\$10,500
 06 Mercury Mariner Premier loaded, leather.....\$9,995
 03 Mazda Tribute ES, loaded, sunroof, 80K.....\$7,995
 AUTOLAND 365-7891
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CADILLAC 2000 Escalade, Black 130K mi., Bose sound system, \$6,500 or best offer.
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CHEVY 2001 Tahoe LT w/autolide suspension, Full loaded, 151K miles, 4WD, Black leather interior, CD/DVD, dual air, power windows, power everything, air sun roof, tow package. Excellent condition, \$8900. (319)360-2959

CHEVY 2000 Silverado, AWD Z71 LT, Heated Leather, T-Topper, 147K Miles, \$7950 (319)899-1054
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CHEVY 1998 Tahoe 4x4, over \$4,000 of upgrades, includes KC day lights, upgraded stereo system, running boards, brush guard, lots of extras. \$3,850. 319-560-9245 or 563-249-4335.

CHEVY 1996 Suburban LT 2WD, leather, tow package, rear heat air, running boards, 3rd seat, near new tires, extremely well maintained, 205K mi. \$3900/OBO. 319-551-5474

CHEVY 1990 C1500 V-8 driver, \$1,450. 319-993-6315

CHEVY 1989 Silverado, Half-Ton, 4wd, power steering, brakes, automatic, new motor, new paint, \$2000. 319-936-1217

FORD 2006 F-350 short bed dually, 42,500 miles, 4L diesel engine, 4x4, XLT Lariat, while in color, excellent condition. Must sell. \$29,500 or best offer. 608-632-2669.

02 Ford F-150 Lariat Crew.....6995
 06 Hyundai Sonata 62K.....6995
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 95 Jeep Cherokee 4x4 Plover.....5995
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 98 Dodge Durango 4x4.....3995
 99 Volvo V70 4x4 Wagon.....3995
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 03 Buick Century 130K.....2995
 97 Chevy Blazer 4x4.....2995
 99 GMC Bravada.....2995
 97 Buick Wildcat.....1995
 97 Buick Century.....1895
 96 Pontiac Grand Am.....1695

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FORD 1998 F-150, 4x4 X-Cab, excellent condition, \$4800.
 319-431-7269.

FORD 1996 RANGER PICKUP 4 cylinder, runs but needs work. Make an offer. 319-393-0708. 319-899-7907.

GMC 2008 Sierra 1500 4x4 X-cab SLT, 11,000 miles, 5.3 auto, highly optioned & accessories, \$28,995. 319-849-2940.

GMC 2005 1/2 ton reg cab, 8' box, V6, \$12,300. \$1000's below, 61K, 319-329-2986. Nice truck.

GMC 1988 K3300, automatic, AWD, 454 V-8, 3 year old 7 1/2 ft. Hinker snowplow. Body rusty but ready to push snow. \$27,500.00 (319)321-0535
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 www.donshonda.com

2007 VFR800, 25th anniversary edition, 500 miles, fuel-injection V-twin engine, Don's Honda, 537 Hwy 1 W., Iowa City, 319-338-1077
 www.donshonda.com

2 Yamaha Grizzly AT V's, 2007, 125cc, automatic, \$2,600. 2006, 80cc, \$2,400, both in excellent condition, Carnation, Iowa. Very few hours. 319-578-5148

RVS, camping equipment

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Class A motor home, 37', 22K mi., 2 slides, non smoker, very clean. Sell below book. \$50,000. Swisher Bank (319) 857-4131

FOREST RIVER 2005 Cardinal 5th slide, 33' L, 29' R, 10' W, 5' D space, 2 slides, kindle, size bed rear kitchen, loaded, \$26,500 or best offer. Call 319-350-2880

GULFSTREAM, 2004, Yellow-stone, 5th wheel Y30F-SK XL edition, 30 with 3 slides and hitch. \$22,500. 319-452-2726

Ketelsen RV 319-377-8244 ketelsenrv.com

Lasso E RV

lost and found

LOST:

Cat, large male orange tabby, very friendly, no collar, but has micro chip. Last seen November 10, in Mt Vernon. REWARD. Please call 895-8017

LOST: Large red dog, "Red" & Black & tan German Shepherd, "Tank", both neutered, in Palo area. Reward: 319-432-5708.

GENERAL Contractor, Walsh II, is soliciting local Iowa Subcontractors for bids on the Iowa Corrections Institution for Women Building. Package Project in Mitchellville. This \$48mm project includes construction of 14 new buildings and the expansion of existing buildings. Small Business are encouraged to bid. Bids will be received until 5pm 12/8 via fax at 312-563-5466. For more information and to obtain drawings please contact Michael Pearson at 312-563-5400 or mpearson@walsihgroup.com

GENERAL Contractor, Walsh II, is soliciting local Iowa Subcontractors for bids on the Iowa Corrections Institution for Women Additional Site Preparation. Project in Mitchellville. This \$3.9mm project includes site grading, site electrical work, site utilities and a new geothermal well field. Targeted Small Business are encouraged to bid. Bids will be received until 5pm 12/8 via fax at 312-563-5466. For more information and to obtain drawings please contact Michael Pearson at 312-563-5400 or mpearson@walsihgroup.com

PUBLIC NOTICE: Kirkwood Community College will hold a Public Information Meeting to discuss the proposal of constructing a 2.5 megawatt wind turbine on the College's main campus. The meeting will take place on Tuesday, Dec. 7, 2010, 4:00 to 6:00 PM, Kirkwood Community College, Jones Hall, Room 106. Questions or requests to answer should be e-mailed or e-mail information will be made. For more information regarding the proposed project contact: Mr. Thomas Kaldenberg, Executive Director of Facilities, Kirkwood Community College, 6301 Kirkwood Blvd SW, Cedar Rapids, IA 52406, (319)398-5569 thomas.kaldenberg@kirkwood.edu

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FOUND: Female black & white border collie mix, very friendly, collar on, in Lisbon? My Vermon area. 319-221-4663

LOST: Cat, large male orange tabby, very friendly, no collar, but has micro chip. Last seen November 10, in Mt Vernon, NEWARK. Please call 895-8017

LOST: Large red dog, "Red" & Black & tan German Shepherd, "Tank", both neutered, in Palo area. Reward. 319-432-5708.

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GENERAL CONTRACTOR, Walsh II, is soliciting local Iowa Subcontractors for bids on the Iowa Corrections Institution for Women Building Package Project in Mitchellville. This \$39mm project includes site grading, site electrical work, site utilities and a new geothermal well field. Targeted Small Business are encouraged to bid. Bids will be received until 5pm 12/8 via fax at 312-563-5466. For more information and to obtain drawings please contact Michael Pearson at 312-563-5400 or mpearson@walsiigrp.com

GENERAL CONTRACTOR, Walsh II, is soliciting local Iowa Subcontractors for bids on the Iowa Corrections Institution for Women Additional Site Preparation Project in Mitchellville. This \$39mm project includes site grading, site electrical work, site utilities and a new geothermal well field. Targeted Small Business are encouraged to bid. Bids will be received until 5pm 12/8 via fax at 312-563-5466. For more information and to obtain drawings please contact Michael Pearson at 312-563-5400 or mpearson@walsiigrp.com

PUBLIC NOTICE:

Kirkwood Community College will hold a Public Information Meeting to discuss the proposal of constructing a 2.5 megawatt wind turbine on the College's main campus. The meeting will take place on: Tuesday, Dec. 7, 2010, 4:00 to 6:00 PM, Kirkwood Community College, State Hall, Room 108. Questions will be made available to answer questions. No formal or written information will be prepared or posted prior to the meeting. Mr. Thomas Kaldenberg, Executive Director of Facilities, Kirkwood Community College, 6301 Kirkwood Blvd SW, Cedar Rapids, IA 52406, (319) 398-5569 or thomas.kaldenberg@kirkwood.edu

personals 212

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Horoscopes

Check the day's rating: 10 is the easiest day, 0 the most challenging.
 November 27
Sagittarius (Nov. 22-Dec. 21): (8) Take time today for charitable activity. It could be as simple as dropping off items at the thrift store, or mailing a letter. Maintain a thankful perspective.
Capricorn (Dec. 22-Jan. 19): (8) Now you're ready to take on something different. Plan your budget carefully to avoid overlooking a significant obligation. Then move forward confidently.

Aquarius (Jan. 20-Feb. 18): (7) Prepare early for today's activities. That way you can relax and enjoy the afternoon without worry while surrounded by special people. Savor the conversation.
Pisces (Feb. 19-March 20): (6) With a little effort, you get everyone involved today. You're out the door, ready to run circles around obstacles. Bring a cell phone and arrange where to meet up.
Aries (March 21-April 19): (8) The atmosphere relaxes now, as each person finds their own entertainment for the day. You might even have time to watch a romantic movie. Enjoy the rest.

Taurus (April 20-May 20): (8) Career associates have brilliant imaginations about how to proceed. There's great chat-service directory 239

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GERMAN SHEPHERD registered pups, 8 weeks old, black & tan. 641-823-4747.

GERMAN Shorthair pups, 6 months old, shots to date. Great bloodlines. \$300/each. (319) 848-7261

GOLDEN-RETRIEVERS, AKC, both parents on 20 acres. Was \$600/ea. Now \$300/ea. 563) 381-2908

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JACK RUSSELLS, Rat Terriers 6 weeks, 6 of each, \$40-50. 319-938-2993 or 319-558-8655

LAB, chocolate female, 11 weeks old, vet work done, 641-990-2623.

LAB-MIX puppies, 12 weeks old, \$40/ea. (319) 213-6040.

LAB PUPPIES, AKC, Black females, family raised, 11 weeks old, current on shots, \$150. 319-551-8173.

LABS, AKC, chocolate & black, shots & wormed, will be ready 12/6, will hold for Christmas. \$200-\$225. 319-430-0419.

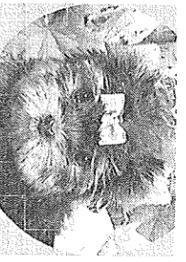
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CARIN Terrier pups. Registered A.P.R. 9 weeks old, wheaten color, \$200 641-660-1378

Chihuahua 9/08/10, black and tan, short hair, adorable, vet check, registered A.P.R. \$275. 641-660-1378

CHIHUAHUA Puppies, MALES, shots, dewormed, ready to go. \$150. CASH. 319-474-2211

DACHSHUND born 8/19/10, black and tan female, black and tan male, red and tan male neutered, \$110. 641-660-1378

DACHSHUND - minatures, long and short haired, chocolate, black and tan and red color, 9 wks and 11 wks old. \$300.00 (319) 983-2762

SEE PHOTOS ONLINE AT
 www.thegazette.com/classifieds

DASCHUND PUPPIES, 2 females, \$150/ea. 1 male, \$200. 10 weeks old, ready to go. shots & wormed. 563-608-0989.

ENGLISH Bulldog Pups ready now. Stud service available. Call for more info. 319-389-1947

EKIMMO SPITZ puppies, pure bred family raised, Males & females. \$125/ea. 319-240-9082

FOX Terrier pups, ready to go, good for small game, \$85 each 319-325-4040 or 319-558-2475

GERMAN Shepherd AKC pups, German & Czech bloodline, excellent temperament & hips. 319-269-1064

GERMAN Shepherd dogs AKC, black/tan, 9 wks, Manchester \$300 each. 563-927-4036

GERMAN SHEPHERD registered pups, 8 weeks old, black & tan. 641-823-4747.

GERMAN Shorthair pups, 6 months old, shots to date. Great bloodlines. \$300/each. (319) 848-7261

GOLDEN-RETRIEVERS, AKC, both parents on 20 acres. Was \$600/ea. Now \$300/ea. 563) 381-2908

GREAT Dane AKC, black w/white old, kings & females, 4 months old, superb bloodlines. \$350 (3 1 9 2 1 0 - 3 6 4 7 Kristip99@gmail.com

HAWAIIANSE AKC puppies, shots, health checked, wormed. (660) 341-7452 www.hav-on-hawaiianse.com

JACK RUSSELLS, Rat Terriers 6 weeks, 6 of each, \$40-50. 319-938-2993 or 319-558-8655

LAB, chocolate female, 11 weeks old, vet work done, 641-990-2623.

LAB-MIX puppies, 12 weeks old, \$40/ea. (319) 213-6040.

LAB PUPPIES, AKC, Black females, family raised, 11 weeks old, current on shots, \$150. 319-551-8173.

LABS, AKC, chocolate & black, shots & wormed, will be ready 12/6, will hold for Christmas. \$200-\$225. 319-430-0419.

LABS AKC Fox Red, Adult male & female, excellent pedigree & breeders \$150.00/ea (319) 573-1456

LABS - Yellow, 10 wks, old, shots, wormed, mother on site. 319-480-2233.

VANS

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VANS

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BIG FINISH OF 2010 THE BIG FINISH OF 2010
Our BIGGEST offer Ever on the Best Selling Minivans in the Midwest Business Center!

\$343 for 72 months! (Touring)
2010 Chrysler Town & Country
0% for 72 months + \$1,500 Bonus Cash
-\$1,500 Consumer Cash
-\$750 T&C Bonus Cash (Non safety 1st)
-\$950 MM Bonus Cash
-\$2,000* Owner Loyalty or Conquest Seg
Loyalty Cash
-\$1,000 MM Commercial Bonus Cash
= \$6,000 Total Savings*
*\$2,000 Owner Loyalty/Conquest Cash on T&C Ltd Financing & 6% Car SFC/CPM; \$1,000 on T&C LK & 6% Car SFC/CPM. See Dealer for details!

\$276 for 72 months! (SE Model)
2010 Dodge Grand Caravan
0% for 72 months + \$300 Bonus Cash
-\$2,000 Consumer Cash
-\$800 MM Bonus Cash
-\$2,000* Owner Loyalty or Conquest Seg
Loyalty Cash
-\$1,000 MM Commercial Bonus Cash
= \$5,500 Total Savings*
*\$2,000 Owner Loyalty/Conquest Cash on T&C Ltd Financing & 6% Car SFC/CPM; \$1,000 on T&C LK & 6% Car SFC/CPM. See Dealer for details!

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EXCEPTIONAL SELECTION OF PRE-OWNED, OFF-LEASE, LOCAL TRADES

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2009 Challenger R/T \$26,995 Leather, HEMI, 15k Stk # U0915	2008 PT Cruiser \$14,995 Turbo, Moonroof, Loaded
2008 Town & Country Limited \$25,995 All Options, Loaner Stk # U08993	2008 Caliber R/T \$15,995 AWD, Leather, 8k Stk # U2818
2008 Dakota Laramie \$25,995 Leather, 4 floor, Loaded Stk # U08889	2008 RAM 1500 \$27,995 Laramie, Loaded, 27k Stk # U4292
2008 RAM 1500 SLT \$21,995 Long Box, Loaner, 16k Stk # U0934	2008 RAM 1500 SLT \$27,995 Loaded, 12k Stk # U9709
2008 RAM 1500 SLT \$27,995 HEMI, Bad Cover, 25k Stk # U0955	2007 Chrysler 300 \$15,995 Leather, Loaded, 52k Stk # U9588
2007 Chrysler Crossfire \$22,995 Roadster, Loaded, 15k Stk # U3349	2007 Pacifica \$19,995 Limited AWD, 30k Stk # U2651

Reputables

155

GARYS AUTO TROY MILLS, IOWA
1'0 Vibe 32k, front, silver, 4-door, \$4,950
'09 G6 GT 41k, front & right quad, \$4,950
'07 silver sedan, auto, \$4,950
'08 Focus 26k, front, silver, \$5,650
'07 silver sedan, auto, \$5,650
'07 Rio SX 49k, front, white, sedan, \$2,650
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trucks, sport utilities

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AUTOLAND
06 Mercury Mariner Premier, \$11,995
06 Ford Escape XLT, loaded, 60k \$10,995
03 Ford Escape XLT, AWD, V6, loaded, sunroof \$10,500
06 Mercury Mariner Premier loaded, leather \$9,995
03 Mazda RX-8, manual, 9,995 \$10,500
AUTOLAND 365-7891
1920 6th St SW
www.autolandret.com

CHEVY 2001 Tahoe LT w/autoride suspension, Fully loaded, 151k miles, AWD, Black exterior, Grey interior, CD/DVD, dual airbags, leather, power everything, air, sun roof, low package. Excellent condition, \$8900. (319)360-2959

CHEVY 2000 Silverado, AWD Z71 LT, Heated Leather, Topper, 147k Miles, \$7950 (319)899-1054 doukellew70@gmail.com

CHEVY 1999 Tahoe LT, only 94k mi., leather heated seats, rear air controls, tow package, new tires, Chrome Eagle Alloy Rims, Great Shape! All the 4-wheel Drive Power You Need for Winter, \$7500/obo. 533-5521 319-360-9245 or 563-249-4335.

CHEVY 1998 Tahoe 4x4 over \$4,000 of upgrades. Includes KC day lights, upgraded stereo system, running boards, brush guard, lots of extras. \$3,850. 319-360-9245 or 563-249-4335.

CHEVY 1996 Suburban LT, 2WD, leather, tow package, rear heat, rear turn, 192,000 miles, 5 spd well maintained, 205k, extremely well maintained. \$3,900/OBO. 319-851-5474

CHEVY 1990 C1500 V-8 automatic, air, great winter driver, \$1,450. 319-393-6315

CHEVY 1989 Silverado, Half-Ton, 4wd, power steering, brakes, automatic, new motor, new paint, \$2000. 319-936-1217

DODGE 2004 Ram Crew Cab, 4x4 \$13,495 LINCOLN WAY 369-9444 4400 Mt. Vernon Rd. SE

**02 Ford F-150 Lariat Crew 6995
06 Hyundai Sonata 62k 6995
79 Pontiac Firebird 5995
05 Chevy Durand 4x4 5995
98 Jeep Wrangler 4x4 75k 5995
95 Jeep Cherokee 4x4 PLOW 5995
05 Pontiac Grand Prix 5995
00 Mitsubishi Eclipse 115k 3995
98 Dodge Durango 4x4 3995
99 Volvo V70 4x4 Wagon 3995
90 Dodge 350 Dump Truck 3995
03 Buick Century 130k 2995
97 Chevy Blazer 4x4 2995
99 GMC Safari 4x4 1995**

trucks, sport utilities

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JEEP 2007 Liberty, 4x4, 22k miles, power windows & locks \$11,850 AB AUTO, 2710 150th Ave, Manchester • 319-310-3020
JEEP 1999 Cherokee Sport, \$4195 4400 Mt. Vernon Rd. SE LINCOLN WAY 369-9444

SUBARU 2006 FORESTER, 47k miles, AWD, automatic, air, sunroof, bought new, \$14,000. www.WaterlineAuto.com

SUZUKI 1996 X-90, 4x4, fully loaded, one of a kind car with 1-100s \$4500/obo. (319) 341-6098

TOYOTA 2008 Tundra CrewCab Ltd, 32k miles, leather, sun roof, Remote Start, Truxedo Over Back Cover, Navigation, DVD, Backup Camera, 9,995 loaded \$36,500/OBO (319)310-2322

30' ENCLOSED Trailer, '03 H&H Cab hauler, 14k & V, 6 wheel, 5 spd, included \$6500. W/SH Trade. 319-981-3210.

04 H & H 24' ENCLOSED trailer, 8' inside, ramp door, \$6500 obo. BRIDGESTONE Blizzak 235-60R-18 Snow Tires (4 tires), barley er, power everything, air, sun roof, low package. Excellent condition, \$8900. (319)360-2959

CHEVY TRUCK PARTS - 66-98 motors, body parts, training, repair, 319-500, 319-881-5210

JUST like new used tires Most Sizes Available, \$20 & Up EconoTow, 373-6033

ABSOLUTELY All Cars Wanted! Junk, mechanically challenged or Used. Paying \$200-\$5000! C.N.L. Enterprises, 231-0527.

\$400 All Autos Run/Drive, Cash Paid, Same Day Pick-Up, 241-3881 www.cashpaidorvehicles.net

ANY CAR ANY CONDITION. FREE PICK UP. CASH PAID. PHILLIPS, 319-560-4593

\$ AUTOS = CASH \$ \$200 with pickup for any vehicle, anytime Call (319) 241-4872

BIG BUCKS - All Cars With Mechanical Problems \$5Cash Paid! Call 319-571-3283

\$300 MINIMUM for most vehicles OR \$500 min. for 2000 & newer. 319-240-5737.

HARLEY WANTED! Trade your bike for car, truck, or cash 849-2432 detramer.com

HARLEY 2010 FAT BOY LOW, 1415 miles, \$15,000 obo. 319-265-1993.

RVs, camping equipment

170

FOREST RIVER 2005 Cardinal 5th wheel camper, 33' L, 29' living space, 2 slides, king size bed, rear kitchen, loaded! \$26,500/ or best offer. Call 319-350-2880.

GULFSTREAM 2004, Yellowstone, 5th wheel Y30FSK XL edition, 30' with 3 slides and hitch. \$22,500. 319-432-2776

Ketelsen RV 319-377-8224 ketelsenrv.com

LASSO E RV Jct. Hwy's 151 & 1, Anamosa lassorv.com 319-482-9298

MAXLITE 2005 ML29RS, front 3 slide bunk house, rear hard side slide out with queen bed, bought new in 2007, many extras, hitch & sway bar. Reduced to \$11,500. 319-541-0503

Sun & Fun RV 319-337-4996 SunandFunRVs.com

WILDWOOD 2008 LE 31QBSB, 17'x50', 3' Trae et Trailer, W/Slide, 10' Bedroom, lots of extras, NADA Value 25,000+ (319)365-2187

WINNEBAGO 1996 Adventurer 34 Super slide, low miles, New tires, batteries & brakes. Non smoker, great shape! \$14,900/OBO 319-396-8539 or 319-350-3188

CROWNLINE 1993 250 CR, Excellent condition, head, shower stove, microwave, must see! Asking \$14,000. Includes trailer. 319-846-2114 or 319-221-2648.

KAYAK & CANOE SALE Huge selection in stock Seaside Watersports Center Seaside, OR 503-606

**89 Seannymph 17, 80hp \$3750
93 Fischer 17, 115hp \$6995
08 Ranger 619, 225-kicker \$3955
09 Lund SSV14, trailer \$15,950
90 Cobalt 252, 454 \$15,500
95 Maxum 1800, 1/0 \$4500
97 Aquadraft 24, 60hp \$7495**

4625 KIE STYLED MARINE Cedar Responder IA 319-364-2896, Kennelwood.com NOTE: New Winter Hours: Tues - Fri 8/5, Sat full moon.

SKI-DOO/CAN-AM \$150,000 in clothing 10 - 800/Elec Gary's, Independence. 319-334-3731

SNOWMOBILES for sale. All makes, models, 319-241-9630 *****

2008 Yamaha Nvtr0, 1049cc brand new, KIE STYLED, 319-241-9630 Iowa City MotorSports 155 ESCORT Ln, Iowa City 319-351-5990 lowactivatorforsports.com

YOUTH Snowmobile safety Class Sponsored by The Frozen Few Snowmobile Club, Dec. 2nd & 3rd, 5-9pm. For more info contact Al at 319-362-2173

**ANNOUNCEMENTS, 202
CEMETERY LOTS, 204
LOST AND FOUND, 206
NOTICES, 208**

notices

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GENERAL Contractor, Waiata II, is soliciting local Iowa Subcontractors for bids on the Iowa Corrections Institution for Women Additional Site Preparation Project in Mitchellville. This \$3.9mm project includes site grading, site electrical work, site utilities and a new geothermal well field. Targeted completion is 12/15/10. Bids are encouraged to bid. Bids will be received until 5pm 12/6 via fax at 312-563-5466. For more information and to obtain drawings please contact Michael Pearson at 312-563-5400 or mpearson@waishrpurd.com

GENERAL Contractor, Waiata II, is soliciting local Iowa Subcontractors for bids on the Iowa Corrections Institution for Women Building Package Project in Mitchellville. This \$4.3mm project includes construction of new buildings and the renovation and expansion of 1 existing building. Targeted completion is 12/15/10. Bids are encouraged to bid. Bids will be received until 5pm 12/6 via fax at 312-563-5466. For more information and to obtain drawings please contact Michael Pearson at 312-563-5400 or mpearson@waishrpurd.com

PUBLIC NOTICE: Kirkwood Community College will hold a Public Information Meeting to discuss the proposal of constructing a 2.5 megawatt wind turbine on the College's main campus. The meeting will take place on Tuesday, Dec. 7, 2010, 4:00 to 6:00 PM. Kirkwood Community College, Jones Hall, Room 108. Start will be available to answer questions. No formal presentation will be made. For more information regarding the proposed project contact: Mr. Thomas Kaldenber, Executive Director, Kirkwood Community College, 6301 Kirkwood Blvd SW, Cedar Rapids, IA 52406, (319)398-5569 thomas.kaldenber@kirkwood.edu

PERSONALS 212

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SERVICES 212

**BUSINESS-TO-BUSINESS 301
FINANCIAL 302
PERSONAL, HEALTH CARE 304
CHILD CARE 316
INSTRUCTIONS, TUTORING 318
EVENT PLANNING 319
WEDDING, PARTY 320
HEALTH, BEAUTY 325
NEW HOME CONSTRUCTION 331
CONCRETE, MASONRY 332
CONSTRUCTION 333
TREE SERVICES 335
EXCAVATING, GRADING 336
HOME SERVICES 337
LANDSCAPING, LAWN, GARDEN 339**

**ROOFING, SIDING, GUTTERS 340
WATERPROOFING 342
CARPENTRY, REMODELING 344
PAINTING, PAPERING 356
FLOOR, TILE, RUGS 357
HOME OFFICE CLEANING 360
ENVIRONMENTAL SERVICES 361
COMPUTER SERVICES 364
TELEPHONE SERVICES 367
HAULING, REMOVAL 370
SNOW REMOVAL 372
MOVING/STORAGE 374
GENERAL SERVICES 379**

SERVICE 299

directory

Woodson, Stacy

From: Woodson, Stacy
Sent: Tuesday, November 30, 2010 1:09 PM
To: 'Melissa.rossiter@go.doe.gov'; 'Chris.paulsen@go.doe.gov'; 'Henry.fowler@go.doe.gov'; 'Jamie.cornell@go.doe.gov'; 'Paritosh.kasotia@iowa.gov'; 'Kevin.eppens@iowa.gov'; 'rholder@jason.com'; 'B.Larson@cedar-rapids.org'; 'kirsten.running-marquardt@legis.state.ia.us'; 'wally.horn@legis.state.ia.us'; 'linda.langston@linncounty.org'
Cc: 'Tkalden@kirkwood.edu'; Fisher, Mike; McCaslin, Ted
Subject: Kirkwood Wind Turbine - Public Information Meeting
Attachments: Public_Notice_for_Media.pdf

This is a reminder that the public information meeting for the proposed wind turbine at Kirkwood Community College is on Tuesday, December 7 from 4 to 6 PM. The meeting is on Kirkwood's Campus in Jones Hall, Room 108. The attached notice was published in the Cedar Rapids Gazette Nov. 26-28. Please let me know if you have questions regarding the upcoming public meeting.

Thank you,

Stacy E. Woodson, P.E.
Group Leader/Project Manager
Howard R. Green Company
progress.innovation.expertise

8710 Earhart Lane SW
Cedar Rapids, IA 52404
Direct: 319-841-4390
Fax: 319-841-4012
Visit: www.hrgreen.com for recent news.

APPENDIX B

Consultation Letters



ALL of My Cases (Off Airport)

All Cases	Filter by Case Status	Cases Requiring Action
Show All Cases (4)	Draft (0) Accepted (4) Work in Progress (0) Determined (0) Circularized (0) Terminated (0)	7460-2 Required (0) Add Letter (0)

Records 1 to 4 of 4

Page 1 of 1

Project Name	Structure Name	ASN	Status	Date Accepted	Date Determined	City	State
KIRKW-000144233-10	Site 2	2010-WTE-6054-OE	Accepted	04/15/2010		Cedar Rapids	IA
KIRKW-000144233-10	Site 3	2010-WTE-6055-OE	Accepted	04/15/2010		Cedar Rapids	IA
KIRKW-000144233-10	Site 4	2010-WTE-6052-OE	Accepted	04/15/2010		Cedar Rapids	IA
KIRKW-000144233-10	Site 1	2010-WTE-6053-OE	Accepted	04/15/2010		Cedar Rapids	IA

Rows per Page: 20

Records 1 to 4 of 4

Page: 1

Page 1 of 1

Draft: Cases that have been saved by the user but have not been submitted to the FAA.
Accepted: Cases that have been submitted to the FAA.
Add Letter: Cases that have been reviewed by the FAA and require additional information from the user.
Work in Progress: Cases that are being evaluated by the FAA.
Determined: Cases that have a completed aeronautical study and an FAA determination.
Terminated: Cases that are no longer valid.
 Please allow the FAA a minimum of 30 days to complete a study.
[Click here to contact the appropriate representative.](#)



Notice of Proposed Construction or Alteration - Off Airport

Project Name: KIRKW-000144233-10 Sponsor: Kirkwood Community College

Details for Case : Site 1

[Show Project Summary](#)

Case Status	
ASN:	2010-WTE-6053-OE
Status:	Accepted
Date Accepted:	04/15/2010
Date Determined:	
Letters:	None
Documents:	04/15/2010 Site_1_Maps.pdf
Construction / Alteration Information	
Notice Of:	Construction
Duration:	Permanent
<i>if Temporary</i> :	Months: Days:
Work Schedule - Start:	09/01/2010
Work Schedule - End:	05/31/2011
State Filing:	Not filed with State
Structure Details	
Latitude:	41° 54' 52.56" N
Longitude:	91° 38' 58.37" W
Horizontal Datum:	NAD83
Site Elevation (SE):	821 (nearest foot)
Structure Height (AGL):	377 (nearest foot)
Requested Marking/Lighting:	White-medium intensity
<i>Other</i> :	
Recommended Marking/Lighting:	
Current Marking/Lighting:	None
<i>Other</i> :	<input type="text"/>
Nearest City:	Cedar Rapids
Nearest State:	Iowa
Description of Location:	Kirkwood Community College main campus in Cedar Rapids, Iowa. Section 15, Township 82N, Range 7W.
Description of Proposal:	Construct four 1.5 MW (or greater) wind turbines at the Cedar Rapids, Iowa campus. No buildings or overhead transmission lines are included in the proposed proeject at this time.
Structure Summary	
Structure Type:	Wind Turbine
Structure Name:	Site 1
FCC Number:	
Prior ASN:	
Common Frequency Bands	
	Low Freq High Freq Freq Unit ERP ERP Unit
Specific Frequencies	



Notice of Proposed Construction or Alteration - Off Airport

Project Name: KIRKW-000144233-10 Sponsor: Kirkwood Community College

Details for Case : Site 2

[Show Project Summary](#)

Case Status	
ASN:	2010-WTE-6054-OE
Status:	Accepted
Date Accepted:	04/15/2010
Date Determined:	
Letters:	None
Documents:	04/15/2010 Site_2_Maps.pdf
Construction / Alteration Information	
Notice Of:	Construction
Duration:	Permanent
<i>if Temporary</i> :	Months: Days:
Work Schedule - Start:	09/01/2010
Work Schedule - End:	05/31/2011
State Filing:	Not filed with State
Structure Details	
Latitude:	41° 54' 22.25" N
Longitude:	91° 38' 25.23" W
Horizontal Datum:	NAD83
Site Elevation (SE):	825 (nearest foot)
Structure Height (AGL):	377 (nearest foot)
Requested Marking/Lighting:	White-medium intensity
<i>Other</i> :	
Recommended Marking/Lighting:	
Current Marking/Lighting:	
<i>Other</i> :	<input type="text"/>
Nearest City:	Cedar Rapids
Nearest State:	Iowa
Description of Location:	Kirkwood Community College main campus in Cedar Rapids, Iowa. Section 15, Township 82N, Range 7W.
Description of Proposal:	Construct four 1.5 MW (or greater) wind turbines at the Cedar Rapids, Iowa campus. No buildings or overhead transmission lines are included in the proposed project at this time.
Structure Summary	
Structure Type:	Wind Turbine
Structure Name:	Site 2
FCC Number:	
Prior ASN:	
Common Frequency Bands	
	Low Freq High Freq Freq Unit ERP ERP Unit
Specific Frequencies	



Notice of Proposed Construction or Alteration - Off Airport

Project Name: KIRKW-000144233-10 Sponsor: Kirkwood Community College

Details for Case : Site 3

[Show Project Summary](#)

Case Status	
ASN:	2010-WTE-6055-OE
Status:	Accepted
Date Accepted:	04/15/2010
Date Determined:	
Letters:	None
Documents:	04/15/2010 Site_3_Maps.pdf
Construction / Alteration Information	
Notice Of:	Construction
Duration:	Permanent
<i>if Temporary</i> :	Months: Days:
Work Schedule - Start:	09/01/2010
Work Schedule - End:	05/31/2011
State Filing:	Not filed with State
Structure Details	
Latitude:	41° 54' 29.29" N
Longitude:	91° 38' 34.42" W
Horizontal Datum:	NAD83
Site Elevation (SE):	825 (nearest foot)
Structure Height (AGL):	377 (nearest foot)
Requested Marking/Lighting:	White-medium intensity
<i>Other</i> :	
Recommended Marking/Lighting:	
Current Marking/Lighting:	
<i>Other</i> :	<input type="text"/>
Nearest City:	Cedar Rapids
Nearest State:	Iowa
Description of Location:	Kirkwood Community College main campus in Cedar Rapids, Iowa. Section 15, Township 82N, Range 7W.
Description of Proposal:	Construct four 1.5 MW (or greater) wind turbines at the Cedar Rapids, Iowa campus. No buildings or overhead transmission lines are included in the proposed project at this time.
Structure Summary	
Structure Type:	Wind Turbine
Structure Name:	Site 3
FCC Number:	
Prior ASN:	
Common Frequency Bands	
	Low Freq High Freq Freq Unit ERP ERP Unit
Specific Frequencies	



Federal Aviation Administration

« OE/AAA

Notice of Proposed Construction or Alteration - Off Airport

Project Name: KIRKW-000144233-10 Sponsor: Kirkwood Community College

Details for Case : Site 4

[Show Project Summary](#)

Case Status		Date Accepted:	
ASN:	2010-WTE-6052-OE	04/15/2010	
Status:	Accepted	Date Determined:	
		Letters:	None
		Documents:	04/15/2010 Site_4_Maps.pdf
Construction / Alteration Information		Structure Summary	
Notice Of:	Construction	Structure Type:	Wind Turbine
Duration:	Permanent	Structure Name:	Site 4
<i>if Temporary</i> :	Months: Days:	FCC Number:	
Work Schedule - Start:	09/01/2010	Prior ASN:	
Work Schedule - End:	05/31/2011		
State Filing:	Not filed with State		
Structure Details		Common Frequency Bands	
Latitude:	41° 54' 59.51" N	Low Freq	High Freq
Longitude:	91° 39' 3.19" W	Freq Unit	ERP
Horizontal Datum:	NAD83	ERP Unit	
Site Elevation (SE):	810 (nearest foot)	Specific Frequencies	
Structure Height (AGL):	427 (nearest foot)		
Requested Marking/Lighting:	White-medium intensity		
<i>Other</i> :			
Recommended Marking/Lighting:			
Current Marking/Lighting:			
<i>Other</i> :	<input type="text"/>		
Nearest City:	Cedar Rapids		
Nearest State:	Iowa		
Description of Location:	Kirkwood Community College main campus in Cedar Rapids, Iowa. Section 15, Township 82N, Range 7W.		
Description of Proposal:	Construct four 1.5 MW (or greater) wind turbines at the Cedar Rapids, Iowa campus. No buildings or overhead transmission lines are included in the proposed project at this time.		



Federal Aviation
Administration

[« OE/AAA](#)

Project Submission Success

Project Name: KIRKW-000144233-10

Project **KIRKW-000144233-10** has been submitted successfully to the FAA.

Please return to the system at a later date for status updates.



Issued Date: 04/20/2010

Thomas Kaldenberg
Kirkwood Community College
6301 Kirkwood Boulevard SW
Cedar Rapids, IA 52404

**** 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 Site 4
Location:	Cedar Rapids, IA
Latitude:	41-54-59.51N NAD 83
Longitude:	91-39-03.19W
Heights:	427 feet above ground level (AGL) 1237 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, a med-dual system - Chapters 4,8(M-Dual),&12.

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)
- Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.

This determination expires on 04/20/2012 unless:

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

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE POSTMARKED OR DELIVERED TO THIS OFFICE AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before May 20, 2010. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted in triplicate to the Manager, Airspace and Rules Division - Room 423, Federal Aviation Administration, 800 Independence Ave., Washington, D.C. 20591.

This determination becomes final on May 30, 2010 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Office of Airspace and Rules via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

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

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

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Michael Blaich, at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-6052-OE.

Signature Control No: 700482-124986380
Sheri Edgett-Baron
Acting Manager, Obstruction Evaluation Service

(DNH -WT)

Attachment(s)

Additional Information
Map(s)

Additional information for ASN 2010-WTE-6052-OE

The proposed construction would be located approximately 3.33 nautical miles (NM) northeast of the Eastern Iowa Airport (CID). It would exceed the Obstruction Standards of Title 14, Code of Federal Regulations (14 CFR), Part 77 as follows:

Section 77.23(a)(2) by 144 feet - a height that exceeds 283 feet above ground level within 3.33 NM as applied to CID.

The proposal was not circularized for public comment because current FAA obstruction evaluation policy exempts from circularization those proposals that exceed the above cited obstruction standard. This is provided the proposal does not lie within an airport traffic pattern. This policy does not affect the public's right to petition for review determinations regarding structures, which exceed the subject obstruction standards.

AERONAUTICAL STUDY FOR POSSIBLE INSTRUMENT FLIGHT RULES (IFR) EFFECT DISCLOSED THE FOLLOWING:

- > The proposed structure would have no effect on any existing or proposed IFR arrival/departure routes, operations, or procedures.
- > The proposed structure would have no effect on any existing or proposed IFR en route routes, operations, or procedures.
- > The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes.

AERONAUTICAL STUDY FOR POSSIBLE VISUAL FLIGHT RULES (VFR) EFFECT DISCLOSED THE FOLLOWING:

- > The proposed structure would have no effect on any existing or proposed VFR arrival or departure routes, operations or procedures.
- > The proposed structure would not conflict with airspace required to conduct normal VFR traffic pattern operations at any known public use or military airports.
- > The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight.
- > The proposed structure will be appropriately obstruction marked and lighted to make it more conspicuous to airmen flying in VFR weather conditions at night.

The cumulative impact of the proposed structure, when combined with other existing structures is not considered significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities. Nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed construction would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation.



REQUEST FOR IOWA SITE FILE SEARCH
Please note: A fee is assessed for this service.

Name: Ted McCaslin

Company/Agency: Howard R. Green Company

Address: 2550 University Ave W, STE 400N, St. Paul, MN 55114

Phone Number: 651-659-7708 FAX Number (business number only): 651-644-9446

Email tmccaslin@hrgreen.com

I am: _____ Listed on the Iowa SHPO Archaeological Consultants List
_____ Certified by the Society of Professional Archaeologists
_____ On Registry of Professional Archaeologists
_____ Other qualifications (**specify**):

Purchase Order No. (if any): 10100015

Provide Information for this search by: _____ Fax _____ Mail X Email

Agencies Sponsoring or Funding Project: Iowa Office of Energy Independence

Is this search for Section 106/NEPA Compliance? X Yes _____ No

Area of Search County: Linn

Township: 82N Range: 7 Section: 15 Quarter Section(s) SW

Township: _____ Range: _____ Section: _____ Quarter Section(s) _____

USGS Quadrangle Map(s) Name (Please attach with project outlined): Cedar Rapids South

[search will be conducted for sites within one mile of project area] See attached Shapefiles

Maps may be downloaded and printed at http://cairo.gis.iastate.edu/new_site/ (please use 1:24000 quads)

Repository for Project Documentation: _____

FOR OSA USE ONLY (below line)

ISF Search No. _____ Date Received _____

Search Conducted by: _____ Date Completed: _____

Material Sent: _____ Site Location Maps _____ Site form copies (pgs)

_____ Other _____ Letter

Method Sent: _____ Phone _____ Fax _____ Mail _____ Email
(minutes) (pages) (ounces)



Friday, August 06, 2010

Ted McCaslin
Howard R. Green Company
2550 University Ave W, STE 400N
St. Paul MN 55114-

Ref: LN Linn

Iowa Site File Search No. 2010157

Dear Ted:

I have conducted a search of the Iowa Site File for archaeological sites recorded within a one-mile radius of the project area described in your request for search on 8/2/2010. This area is within 82N-7W Sec.15.

Our records indicate that no archaeological site has been reported to the OSA within or very near the project location. Three other sites were recorded within one mile of that location at the time of the records search. Other archaeological sites may be present at or near the project location but have not been discovered or reported to the OSA. Included along with this letter is a map of the survey and site file search location information and previously surveyed areas.

If you have not already done so, you may wish to consult with the State Historic Preservation Office (SHPO) to determine whether an archaeological survey may be needed. In the event that previously unidentified archaeological resources are discovered during ground disturbing activities on projects complying with Section 106 of the National Historic Preservation Act or other applicable federal and state laws, construction work should cease in the area of the resource and in the surrounding area where further subsurface remains can reasonably be expected to occur. The responsible federal or state agency and State Historic Preservation Office should be immediately notified and consulted about the discovery.

If during the course of construction or earthmoving signs of a human burial are encountered, those activities should be stopped at once and the Office of the State Archaeologist should be contacted immediately. Human burials may potentially include bone, ashes, or subterranean structures with or without overlying mound structures. All human burials in the state of Iowa are legally protected under Chapters 263B, 566, and 716 of the Iowa Code.

Should you need more information about a particular site, you may write to me including the appropriate site number in your request. Since every county has a different series of site numbers, be sure to include the full trinomial site designation in your request. This designation takes the form of 13XY### where XY is the county abbreviation and ### is the order in which site reports are received for a given county.

The information in this letter is intended to assist you in fulfilling any local, state, or federal laws and regulations related to archaeological sites concerning historic preservation such as Section 106 of the National Historic Preservation Act and to assist avoidance of any burial sites potentially located within the subject area. Prior to any federal undertaking, all archaeological sites should be evaluated for their National Register eligibility. Federal undertakings include but are not limited to projects receiving any federal financial support, technical assistance, licenses, or permits received by private landowners or federal, state, or local governments. The State Historical Preservation Office (SHPO) would need to be contacted for details about the final determination of significance for any site to be affected by a federal undertaking.

This letter is not meant to confirm or deny that any applicable requirements have been met.

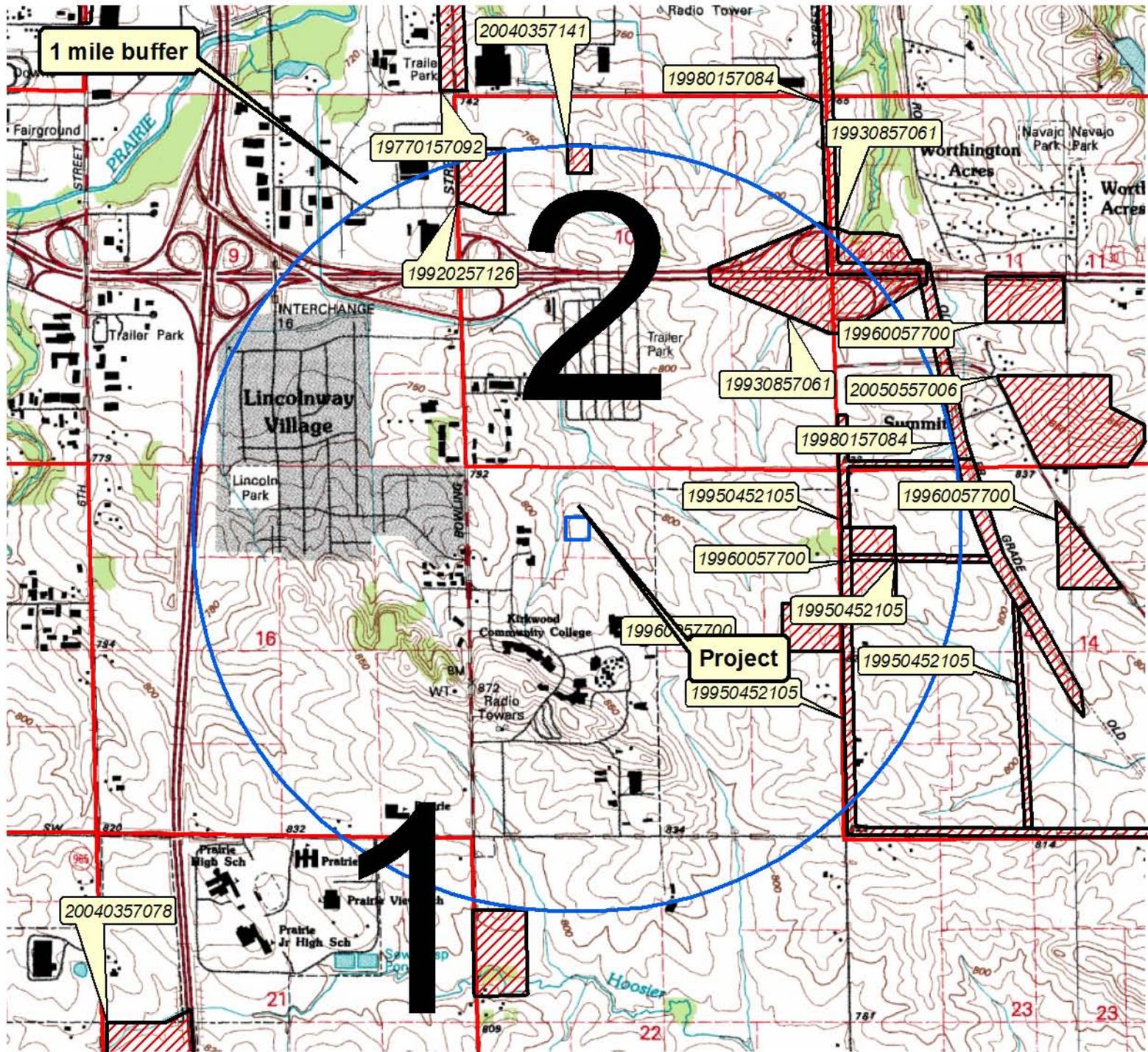
Sincerely,

Colleen Eck
Site Records Manager
enclosure

SITE	Cultural Affiliation	Site Type	AREA	DTYPE
13LN634	Historic Euro-American	Historic farm/residence	2827.161	circle
13LN816	Prehistoric	Prehistoric scatter	314.129	dot
13LN817	Historic Euro-American	Historic farm/residence	489.761	polygon

Dtype definitions

Polygon:	Boundaries and location known
Triangle:	Location and boundaries not certain
Inverted Triangle:	Location known, boundaries unknown
Dot: (10 m radius)	Location known, area < 20 m in any direction
Circle:	Location and site area known, exact boundaries not known



OSA Search 2010157
 Linn County
 Search Date 8/6/2010 CE

N Precise locations outside of the project area may be withheld pursuant to Iowa Code 305A.10

This map contains confidential site location information. Neither the map nor the associated data may be reproduced or distributed without the consent of the Office of the State Archaeologist.

2 Number of sites per section which occur within 1 mile buffer

 Previously surveyed area, "intense" labeled with SHPO R&C number

0 0.125 0.25 0.5 Miles

0 0.3 0.6 1.2 Kilometers





July 1, 2010

Conservation and Recreation Division
Iowa Department of Natural Resources
502 E 9th St.
Des Moines, IA 50319-0034

Re: Environmental Review for Natural Resources

Dear Sir or Madam:

Kirkwood Community College is proposing the construction of wind energy facility. The proposed project consists of the installation of a 2.5 MW wind turbine on the Kirkwood Community College campus in Cedar Rapids Iowa. The project is located in Linn County in Section 15, Township 82N and Range 7W. The location proposed for construction is currently green space. Please see the attached site plan/aerial photograph and the location map. Howard R. Green Company, on behalf of Kirkwood Community College, is requesting an Environmental Review for Natural Resources for this project.

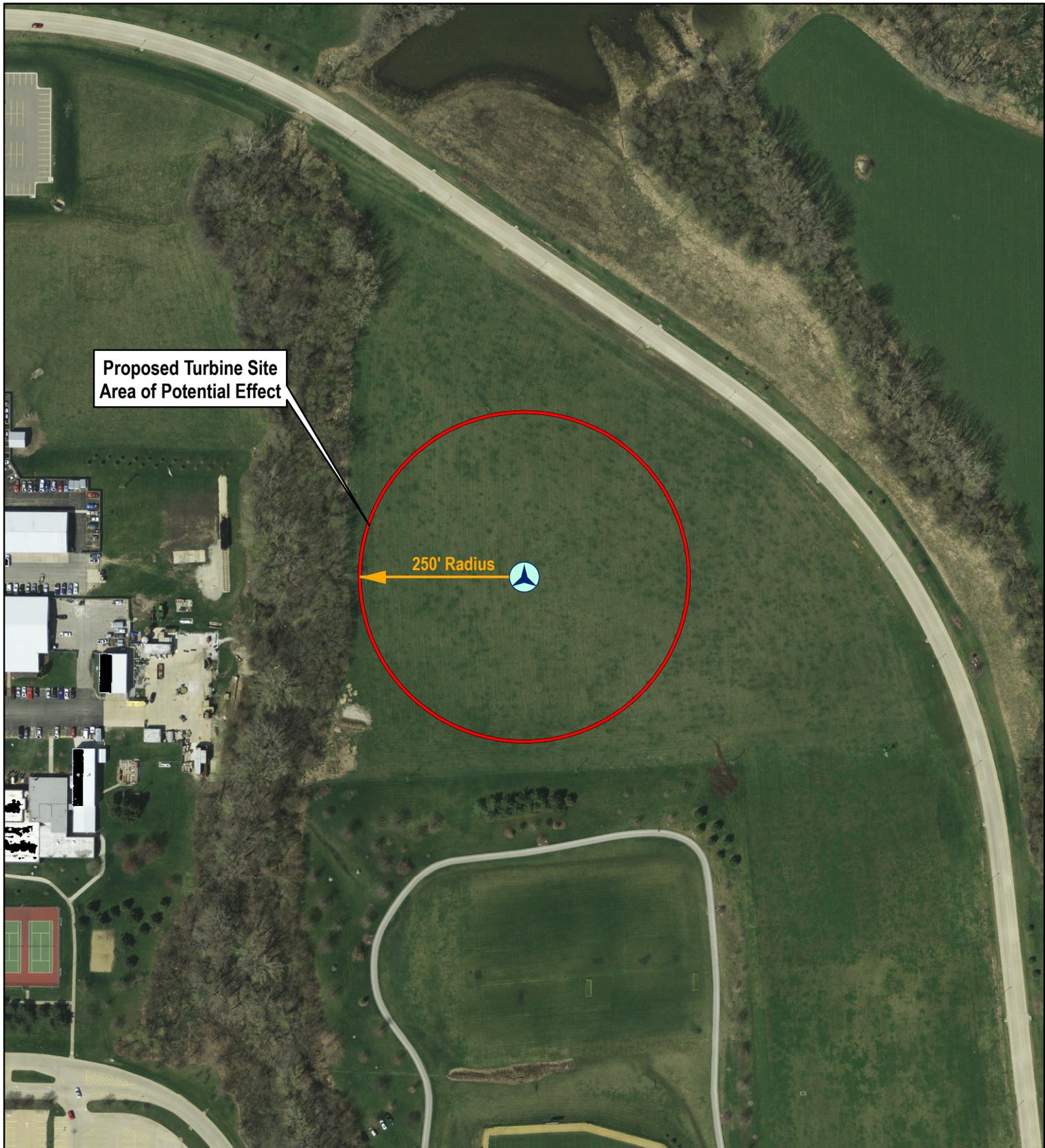
Sincerely,
HOWARD R. GREEN COMPANY

A handwritten signature in blue ink that reads "Ted McCaslin".

Ted McCaslin
Project Scientist

Enclosures:
Site Plan and Aerial Photo
Location Map

progress. innovation. expertise.



Proposed Turbine Site
Area of Potential Effect

250' Radius

 Area of Potential Effect (APE)

 Proposed Turbine Location

 250' Radius of Project Site

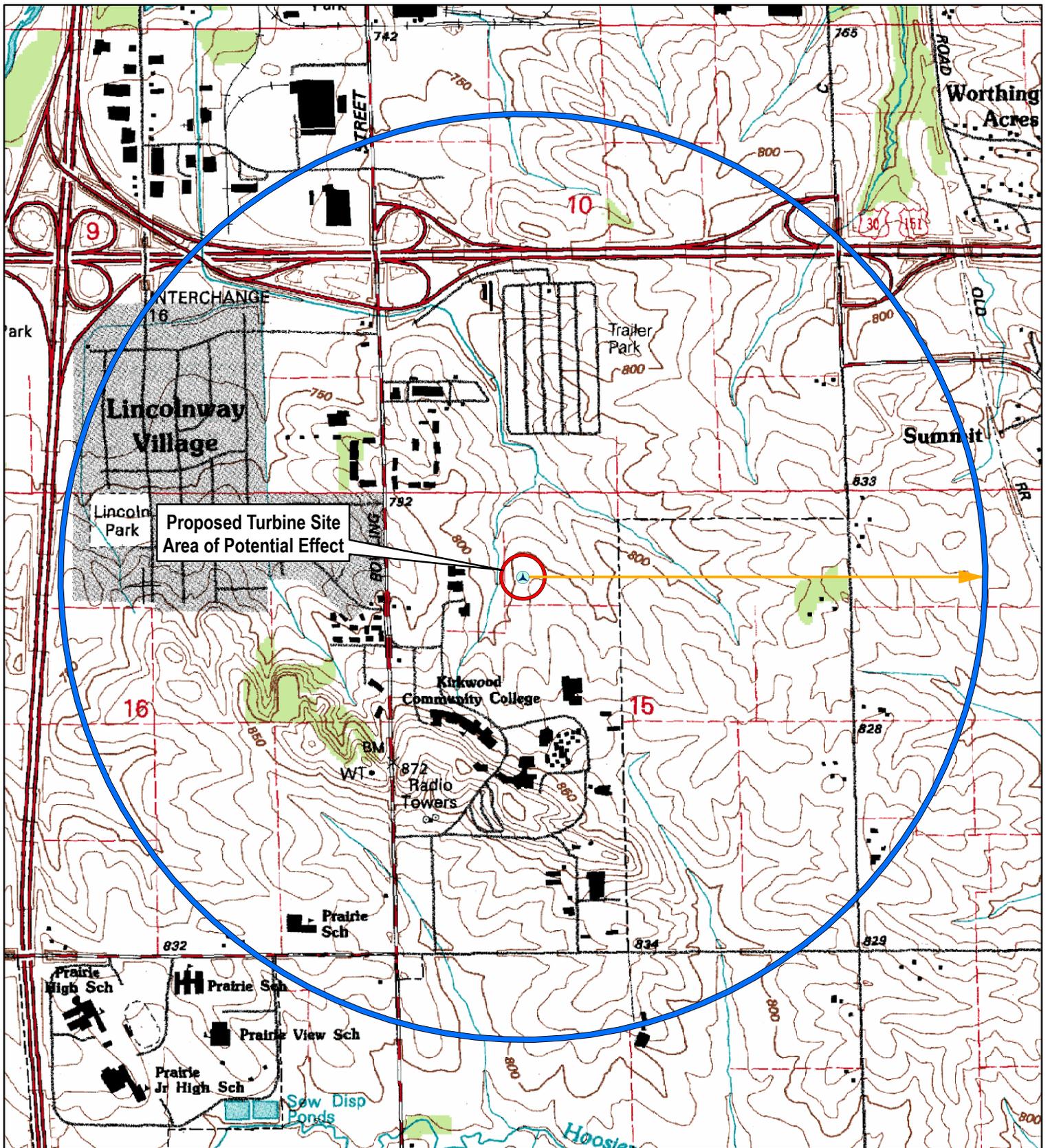


SITE PLAN & AERIAL PHOTO

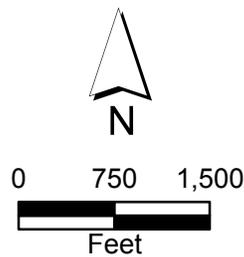
Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

Source: Linn County GIS
0.5-ft resolution aerial photo of Linn County, Iowa (2008)

 Howard R. Green Company



-  Area of Potential Effect (APE)
-  1-Mile Buffer of APE
-  Proposed Turbine Location
-  1-Mile Radius of Project Site



LOCATION MAP

Proposed Wind Facility
 Kirkwood Community College
 Cedar Rapids, Iowa

Source: USDA, NRCS
 Digital Raster Graphic Mosaic of Linn County, Iowa
 USGS 7.5' Quad Mosaic for Linn County, 2002

JUL 23 2010



STATE OF IOWA

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
RICHARD A. LEOPOLD, DIRECTOR

July 16, 2010

Mr. Ted McCaslin
Howard R. Green Company
Court International Building
2550 University Ave. West
Suite 400N
St. Paul, MN 55114

RE: Environmental Review for Natural Resources
Wind Turbine Kirkwood Community College
Linn County
Section 15, Township 82N, Range 7W

Dear Mr. McCaslin:

Thank you for inviting Department comment on the impact of this project. Although the Department does not regulate wind farms, if relatively frequent bird and bat mortality is discovered at the turbine site, please contact the Department for further consultation as it is in the developer's interest to avoid potential conflict with federal and state-listed threatened and endangered species. The college should consider conducting spring and fall bird and bat mortality surveys. This work could be done by students as a learning experience and will add to the information concerning wildlife migration in Iowa. Information titled *Wind Energy and Wildlife Resource Management in Iowa: Avoiding Potential Conflicts* is here as an attachment and is available from the Department website at:

http://www.iowadnr.gov/wildlife/diversity/files/wind_wildliferecs.pdf

The Department, together with the U.S. Fish and Wildlife Service, recommends that tubular turbine supports rather than lattice supports are used to minimize bird perching and nesting opportunities. Avoid placing external ladders and platforms on tubular towers to minimize perching and nesting. Avoid use of guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with recommended bird deterrent devices (Avian Power Line Interaction Committee 1994).

This letter is a record of review for protected species, rare natural communities, state lands and waters in the project area, including review by personnel representing state parks, preserves, recreation areas, fisheries and wildlife but does not include comment from the Environmental Services Division of this Department. This letter does not constitute a permit. Other permits may be required from the Department or other state or federal agencies before work begins on this project.

Any construction activity that bares the soil of an area greater than or equal to one acre including clearing, grading or excavation may require a storm water discharge permit from the Department. Construction activities may include the temporary or permanent storage of dredge material. For more information regarding this matter, please contact Ruth Rosdail at (515) 281-6782.

The Department administers regulations that pertain to fugitive dust IAW Iowa Administrative Code 567-23.3(2)“c.” All persons shall take reasonable precautions to prevent the discharge of visible emissions of

fugitive dusts beyond the lot line of property during construction, alteration, repairing or demolishing of buildings, bridges or other vertical structures or haul roads. All questions regarding fugitive dust regulations should be directed to Jim McGraw at (515) 242-5167.

If you have questions about this letter or require further information, please contact me at (515) 281-8524.

Sincerely,



Daryl Howell
Environmental Specialist
Conservation and Recreation Division

FILE COPY: Kelly Poole

Tracking Number: 3048

Enclosures

Suggested References

Anderson, R., M. Morrison, K. Sinclair, D. Strickland, H. Davis, and W. Kendall. 1999. Studying wind energy/bird interactions: a guidance document. Metrics and methods for determining or monitoring potential impacts on birds at existing and proposed wind energy sites. Avian Subcommittee, National Wind Coordinating Committee, Washington, DC. 87 pp.

Jain, A.A. 2005. Bird and bat behavior and mortality at a northern Iowa windfarm. M.S. Thesis, Iowa State Univ., Ames. 108pp.

Wind Energy and Wildlife Resource Management in Iowa: Avoiding Potential Conflicts

Introduction

Iowa is on its way to ranking among the world's leading producers of wind-generated electrical energy. In our efforts to become less dependent upon fossil fuels, nuclear power, hydropower and other sources with frequent environmental concerns, the possibility of this "green" energy has caused much excitement. Many Iowans eagerly await expansion of this low-cost (after initial infrastructure investments) source of electricity as one step towards energy independence.

The Governor, General Assembly, and Department of Natural Resources all consider wind energy development in Iowa a high priority. With much open farmland upon which wind generators might be placed, and in a region of nation realizing relatively high average wind velocities, Iowa seems destined to be a national focal point for wind energy development. Many state and national conservation organizations also support increasing wind energy production.

No energy source has yet been found to be without some degree of environmental costs, however, and wind energy is no exception. It has been demonstrated that if proper siting of wind turbines is not carefully planned, certain locations may result in collisions with, and death of, both wild birds and bats. In one or two noteworthy instances, excessive mortality of hawks, eagles and other birds of prey has resulted in major modifications to both design and placement of wind turbines, or even periodic shut-downs of large facilities. Additional costs involved with such measures can reduce cost-effectiveness of energy production.

Iowa currently exercises minimal regulation on locating wind farms. Nevertheless, some energy companies recognize the benefits of consulting with wildlife resource managers *before* final decisions are made on siting of new facilities. Such actions will result in greater trust and cooperation between energy producers and those charged with protecting our wildlife resources. This can lead to an orderly and beneficial development of Iowa's wind energy.

An *ad hoc* Iowa wind energy and wildlife discussion group has met infrequently to review current developments regarding wind energy and wildlife interactions. The group consists of representatives from Iowa DNR's Wildlife Bureau and Energy Section, US Fish & Wildlife Service, several non-governmental conservation organizations, energy companies, the Iowa Renewable Energy Association and other interested parties. The group has no rule-making or regulatory authority; rather it simply works cooperatively to discuss mutual concerns and to learn of the latest developments. A map of sensitive natural resource areas was cooperatively created by the group and is available from Iowa DNR and some other represented organizations, in hopes that it might serve as a helpful reference for wind energy development. The latest version of this map may be viewed at: <http://www.iowadnr.com/energy/wind/windwildlife.html>.

Wildlife Concerns

Just what are the problems wind turbines might pose to our wildlife and other natural resources? The most obvious is direct collisions of birds and bats with rotating blades. Fortunately for birds, the annual mortality rate at most Midwestern wind farms appears to remain relatively low and probably insignificant. An exception occurs when turbines are placed in or very near major migration corridors and pathways, such as large river valleys and ridgetops or bluffs. Because birds tend to follow or congregate along these natural landscape features during their semi-annual migrations, wind turbines placed near these features have potential for causing significant bird kills in spring and fall. A few examples of such landscapes in Iowa include the Des Moines River, Little Sioux River, Wapsipinicon River, Loess Hills, and Mississippi River bluffs. Still, with Iowa's mostly open landscape, birds generally are widely dispersed throughout much of the year and chance of interaction with turbines is small.

Bats present an entirely different situation. For reasons still mostly unknown, bat collisions and mortality is much higher than for birds at many wind farms. Early efforts are underway to attempt a better understanding of the problem, but little is known at this time. However, bats usually are associated with trees or wooded areas and wetlands, where the insects on which they feed are abundant. Wind turbines placed near woodlands and wetlands thus might reasonably be expected to result in more bat deaths than turbines situated in open farmlands.

An emerging concern for birds is wind turbines placed within or very near large expanses of grassland. In some western states, ground-nesting lesser prairie-chickens have been found to abandon their nesting grounds when wind turbines were erected and operated nearby. It is quite likely that Iowa's greater prairie-chickens, a state endangered species requiring large expanses of unbroken habitat, would exhibit similar behavior. Many other ground-nesting grassland birds have yet to be studied, but some of these species already are in steep decline nationwide and cannot risk another factor that might potentially threaten their survival. A leading cause of much bird decline is related to fragmentation, or "parcelization", of their remaining habitat, breaking it into parcels too small to meet certain birds' survival or reproductive needs. It has been suggested that wind turbines placed in the middle of a large grassland may similarly fragment habitat and greatly reduce its value. This is a question in need of much additional research.

In summary, adverse effects of wind turbines on birds and bats have been documented in some locations, but much remains to be learned. A few energy companies or developers have collaborated with wildlife researchers to conduct some desperately needed studies. They are to be recognized for their commitment to better conservation of all our natural resources. Nevertheless, much more research is needed, especially in comparing "before and after" effects upon wildlife where wind farms are constructed. Information garnered would be invaluable in helping with future wind farm siting decisions.

Wind Turbine Siting Recommendations and Guidelines

Until we more fully understand how wildlife interacts with wind turbines, interim guidelines have been prepared to help wind energy developers and producers do a better job of designing and siting their wind farms. The list of recommendations below will serve as a starting point for

things that *should* be considered when planning wind energy developments. These have been collected from a variety of sources, chief among them the US Fish & Wildlife Service Interim Guidelines for siting and construction of wind energy facilities, and recommendations from the National Wind Coordinating Committee. Keep in mind that this list is a *work in progress*, subject to change as new information is gained.

Siting Recommendations:

- Avoid placing turbines at locations where any species of fish, wildlife or plants protected under the federal Endangered Species Act have been documented. Information may be obtained by contacting the Iowa Department of Natural Resources Endangered Species Coordinator or Wildlife Bureau staff. Any action resulting in losses to federally-listed species could result in substantial fines or other penalties.
- Avoid placing turbines in or near recognized bird concentration areas or migration pathways, including lakes, wetlands, forests, river valleys, ridge tops or bluff tops, large grasslands, known bird roosting areas, public wildlife areas, parks, and areas with frequent incidence of fog mist or low clouds. While there is no firm information on the amount of buffer zone needed between turbines and these habitats, a separation distance of at least one mile might be considered an absolute minimum (more for prairie-chickens—see below).
- Avoid placement of turbines in or near areas where highly “area-sensitive” wildlife species, such as prairie-chickens, are known. Area-sensitive species *require* expansive, unfragmented habitat. For prairie-chickens in particular, a separation distance of at least 5 miles from all known leks (breeding grounds) is *strongly* recommended.
- Avoid placing turbines near documented bat hibernation, breeding or nursery colonies and in migration corridors (see bird recommendation above) or between known colonies and feeding areas.
- Avoid placement of multiple turbines in close proximity to one another or perpendicular to known migration pathways (typically north-south). Widely spaced turbines, in arrays parallel to normal bird migration routes, can reduce collisions.
- Reduce or eliminate availability of carrion within wind farms, to reduce chances of attracting eagles, vultures and other raptors colliding with turbine blades. Neither dead livestock nor wildlife should be left within or near wind farm boundaries.
- Place wind turbines in areas already fully developed for agriculture, especially row-crop farming, where there is minimal extant wildlife habitat—Iowa is especially rich in such lands, and it has been estimated that as much as 80% of Iowa’s landscape might be considered suitable for wind energy development with few adverse effects upon wildlife.
- If wildlife habitat losses or fragmentation must be mitigated, develop a plan to create or restore habitat *away* from the wind farm site. This will serve to attract birds, bats and other wildlife away from the development and reduce collisions. Wherever possible, coordinate habitat mitigation sites with other public or private wildlife lands, to connect, enlarge or enhance those areas.
- Certain landscapes, such as the Loess Hills in western Iowa and the “Iowa Great Lakes Region” in northwest Iowa, are known for their beauty, rarity *and* for extensive wildlife breeding and migrating activities. Such landscapes should be avoided entirely both for biological and aesthetic reasons.

- Consider possible *cumulative* regional effects of multiple wind energy projects. While one project alone may result in few concerns for wildlife, multiple projects across one landscape could significantly multiply adverse effects.
- A map of Iowa, denoting areas of particular concern for possible adverse effects by wind turbines upon wildlife and habitat, has been developed and is updated periodically. Wind energy developers and planners are encouraged to refer to this map when considering new sites. Construction within these areas may not necessarily result in wildlife conflicts, and consultation with DNR wildlife biologists can assist developers in finding suitable sites within these potentially sensitive landscapes, or in suggesting plan modifications to minimize adverse effects.

Turbine Design and Operation Recommendations:

- Tubular support towers with pointed tops, rather than lattice supports, greatly reduce opportunities for birds to perch or nest upon the structures. Avoiding placement of permanent external ladders or platforms on tubular towers also reduces nesting and perching.
- Avoid use of guy wires for turbine or meteorological tower supports. Any existing guy wires should be marked with recommended bird deterrent devices (Avian Power Line Interaction Committee 1994).
- Taller turbines, having a top-of-rotor sweep exceeding 199 ft., may require lights for aviation safety. The minimum amount of pilot warning and avoidance lighting necessary should be used, and unless otherwise required by the Federal Aviation Administration, only white strobe lights should be used at night. These should be minimized in number, intensity, and number of flashes per minute. Solid red or pulsating red lights should *not* be used, as they appear to attract more night-migrating birds than do white strobes.
- Electric power lines should be placed underground wherever possible, or should utilize insulated, shielded wire when placed above ground, in order to reduce bird perching and electrocution.
- Where the height of rotor-sweep area produces high wildlife collision risks, tower heights should be adjusted to lower risks.
- If wind turbine facilities absolutely must be located in areas known for high seasonal concentration of birds, it is essential that a bird monitoring program be established, with at least three years of data collected to determine peak use periods. Data may be collected by direct observation, radar, infrared or acoustic methods. When birds are highly concentrated in or near the site, turbines should be shut down until birds have dispersed.
- When older facilities must be upgraded or retrofitted, the guidelines above should be employed as closely as possible.

Ideally, a site study plan and description of turbine structural and lighting design should be submitted to Iowa DNR well in advance of final siting decisions, for review by staff wildlife experts and advisements on acceptability or suggestions for modifications and/or monitoring.

Hiring a reputable environmental consultant with a strong background in bat and bird ecology is strongly recommended. A baseline inventory of wildlife and evaluation of habitat should be considered for every site under serious consideration for windfarm development. Use of National Wind Coordinating Committee study guidelines will allow for comparison with other studies. Special attention should be paid to Spring and Fall migration seasons, reviewing migrational use of the proposed site by raptors, waterfowl, shorebirds, gulls, songbirds and bats. Upon completion and startup of wind energy generation, monitoring wildlife populations and migrations should be conducted for at least 2-3 years.

Related Links

The following websites of other agencies and organizations may be useful in further understanding of potential wind energy and wildlife conflicts, and how to reduce or mitigate threats to wildlife:

<http://www.fws.gov/habitatconservation/wind.pdf>

<http://www.nationalwind.org/publications/siting.htm>

<http://www.dnr.wi.gov/org/es/science/energy/wind/guidelines.pdf>

<http://www.aplic.org>

For more information, contact Doug Harr, DNR Wildlife Diversity Coordinator, doug.harr@dnr.iowa.gov, or Lee Vannoy, DNR Energy Section, lee.vannoy@dnr.iowa.gov.



July 2, 2010

Field Supervisor Richard Nelson
USFWS Rock Island Field Office
1511 47th Avenue
Moline, IL 61265

Re: Kirkwood Community College Wind Energy Facility Habitat Assessment

Dear Mr. Nelson:

Kirkwood Community College in Cedar Rapids, Iowa is proposing the construction of a single 2.5 megawatt wind turbine facility on the Kirkwood main campus. Kirkwood is a recipient of State Energy Program (SEP) grant from the Iowa Office of Energy Independence (OEI) and United States Department of Energy (DOE). Partial project funding for the proposed turbine is from this grant. HR Green, on behalf of Kirkwood, is requesting FWS consultation for potential impacts to federally protected species for this project. FWS consultation is required as part of initial NEPA review for this project.

A habitat assessment of the project area and project description is attached. Please call me at 651-659-7708 or email tmccaslin@hrgreen.com if you have questions.

Sincerely,
HOWARD R. GREEN COMPANY

A handwritten signature in blue ink that reads 'Ted McCaslin'.

Ted McCaslin
Project Scientist

Enclosures
Kirkwood Wind Energy Facility Habitat Assessment

progress. innovation. expertise.

PROTECTED SPECIES HABITAT SURVEY

KIRKWOOD COMMUNITY COLLEGE WIND ENERGY FACILITY

**Cedar Rapids
Linn County, Iowa**



Prepared by:

Howard R. Green Company
Cedar Rapids, Iowa

July 2010



1.0 Introduction

Kirkwood Community College is proposing the construction of a single 2.5 megawatt wind turbine at its main campus in southern Cedar Rapids. The proposed turbine would have a hub height of 80 meters and three rotors 50 meters in length.

The project area is located Linn County, Iowa in a vacant with maintained grass (See Figures 1 & 2). Adjacent land use includes playing fields, a wooded creek area, campus buildings and vacant maintained campus land. The proposed project includes an area of potential effect of 4.5 acres. It is located in the SW ¼ of the NE ¼ of the NW ¼ of Sec. 15, T82N, R7W. See attached site photos.

The proposed turbine construction will not require the clearing of any trees or structures and no impacts to waters of the United States are anticipated.

The project is located near the Eastern Iowa Airport and the Federal Aviation Administration (FAA) has issued Determination of No Hazard to Air Navigation (Aeronautical Study No. 2010-WTE-6052-OE) for the proposed turbine.

This document is being prepared to provide the U.S. Fish and Wildlife Service (FWS), a general assessment of habitat conditions within the project area and document potential habitat for federally protected species.

2.0 Linn County Listed Species

The FWS Midwest Section 7(a)(2) Technical Assistance Website¹ shows Linn County within the range of two federally threatened species:

Common Name	Scientific Name	Status	Habitat
Western prairie fringed orchid	<i>Platanthera praeclara</i>	Threatened	Wet prairies and sedge meadows
Prairie bush clover	<i>Lespedeza leptostachya</i>	Threatened	Dry to mesic prairies with gravelly soil

Additionally, Linn County is within the range of the protected Bald Eagle (*Haliaeetus leucocephalus*) (Bald and Golden Eagle Protection Act).

3.0 Habitat Survey

A habitat survey was conducted by Project Scientist Ted McCaslin of Howard R. Green Company on June 12, 2010 to identify potential habitat for protected species listed in Section 2.0.

¹ <http://www.fws.gov/midwest/endangered/section7/s7process/index.html>

3.1 Prairie Bush Clover/Western Prairie Fringed Orchid Survey

No prairie remnants were observed within the proposed construction area. The area of potential effect is mowed maintained grassy area comprised of grass and weed species common throughout Iowa. Species observed within the project area include: Kentucky bluegrass (*Poa praetensis*), fescue (*Festuca spp.*), dandelion (*Taraxacum officinale*), white clover (*Trifolium repens*), common plantain (*Plantago major*) and crabgrass (*Digitaria spp.*). The project area appears to be in row crops in a 1960s aerial photograph (See Figure 3).

3.2 Bald Eagle Habitat Survey

A number of large trees are present immediately west of project area along a small stream. No eagles or eagle nests were observed in the trees. Observed tree species included eastern cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), boxelder (*Acer negundo*), white mulberry (*Morus alba*), black cherry (*Prunus serotina*), and black willow (*Salix nigra*). The approximate age of these trees are between 40-50 years old based on a review of historical aerial photos of the project area and observed tree size and condition (See Figure 3).

No impacts to these trees are proposed for this project.

4.0 Conclusions

The project area is entirely highly disturbed vacant land covered with cultivated and invasive grasses and forbs. No prairie remnants were observed within or near the project area. A forested stream area adjacent to the project area does not appear to be suitable habitat for bald eagle nesting or roosting. No potential habitat for the prairie bush clover, western prairie fringed orchid, or bald eagle appears likely present within the project area.

FIGURES

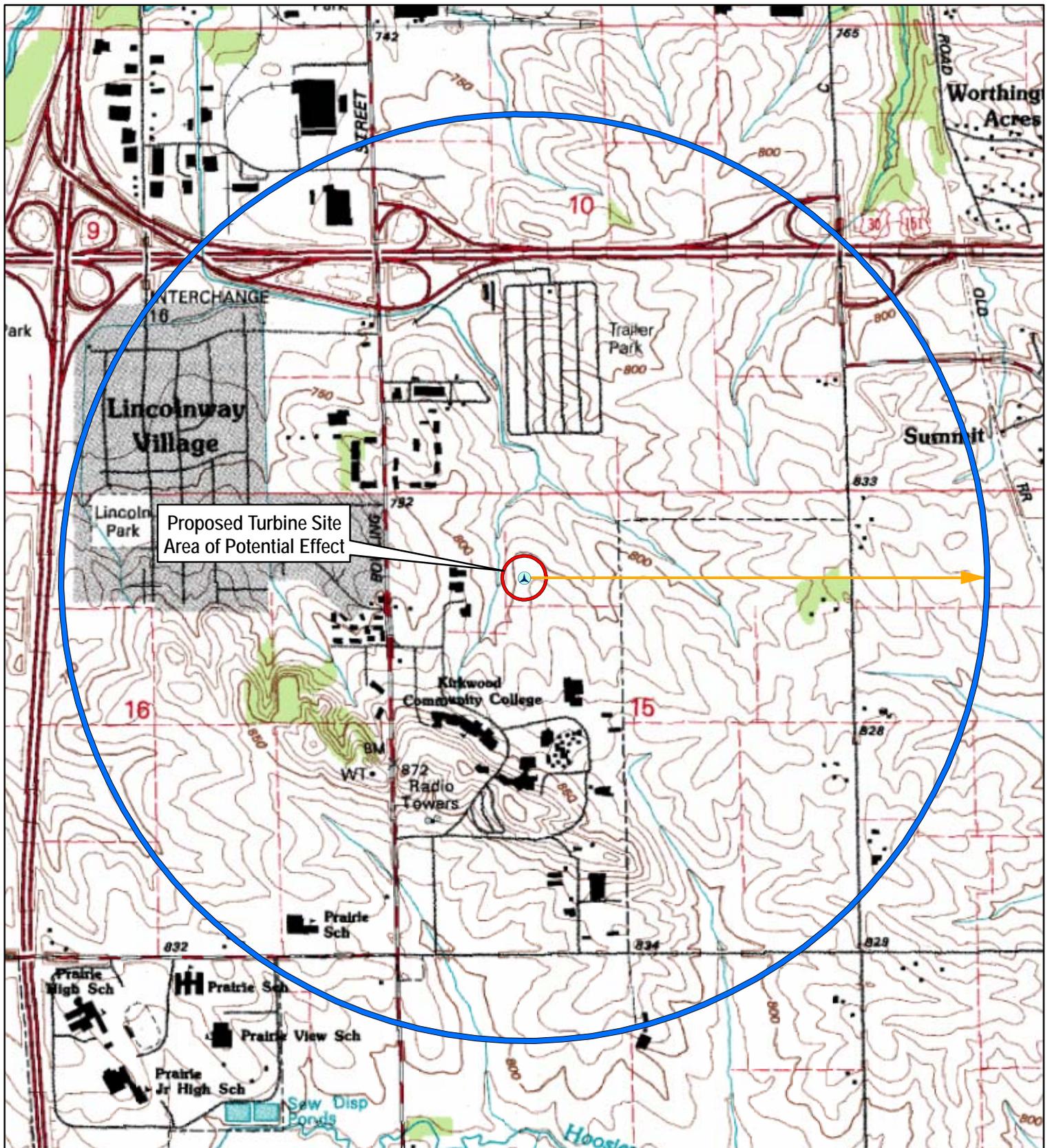
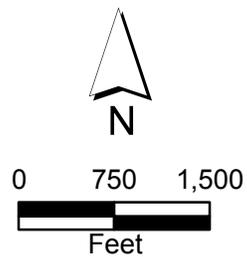


FIGURE 1
LOCATION MAP

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

-  Area of Potential Effect (APE)
-  1-Mile Buffer of APE
-  Proposed Turbine Location
-  1-Mile Radius of Project Site



Source: USDA, NRCS
Digital Raster Graphic Mosaic of Linn County, Iowa
USGS 7.5' Quad Mosaic for Linn County, 2002

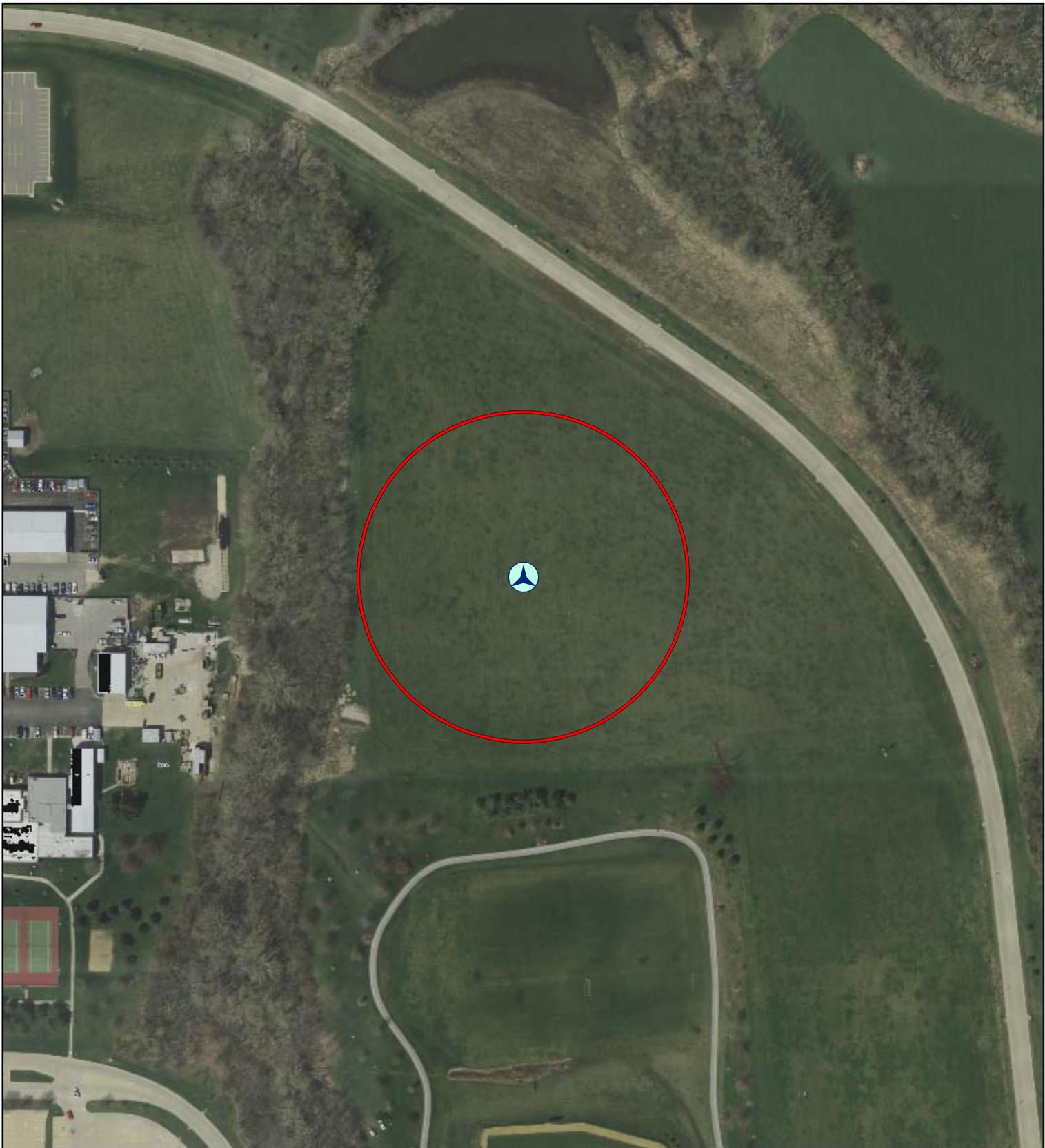
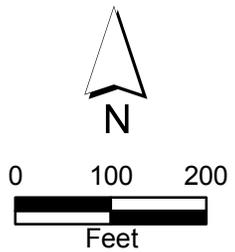


FIGURE 2
SITE MAP

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

 Area of Potential Effect (APE)
 Proposed Turbine Location



Source: Iowa USDA Orthos 1960s



-  Area of Potential Effect (APE)
-  Approximate Forest Location 2010
-  Proposed Turbine Location

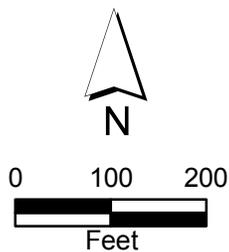


FIGURE 3
1960s Aerial Photography

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

Source: Iowa USDA Orthos 1960s

Appendix A

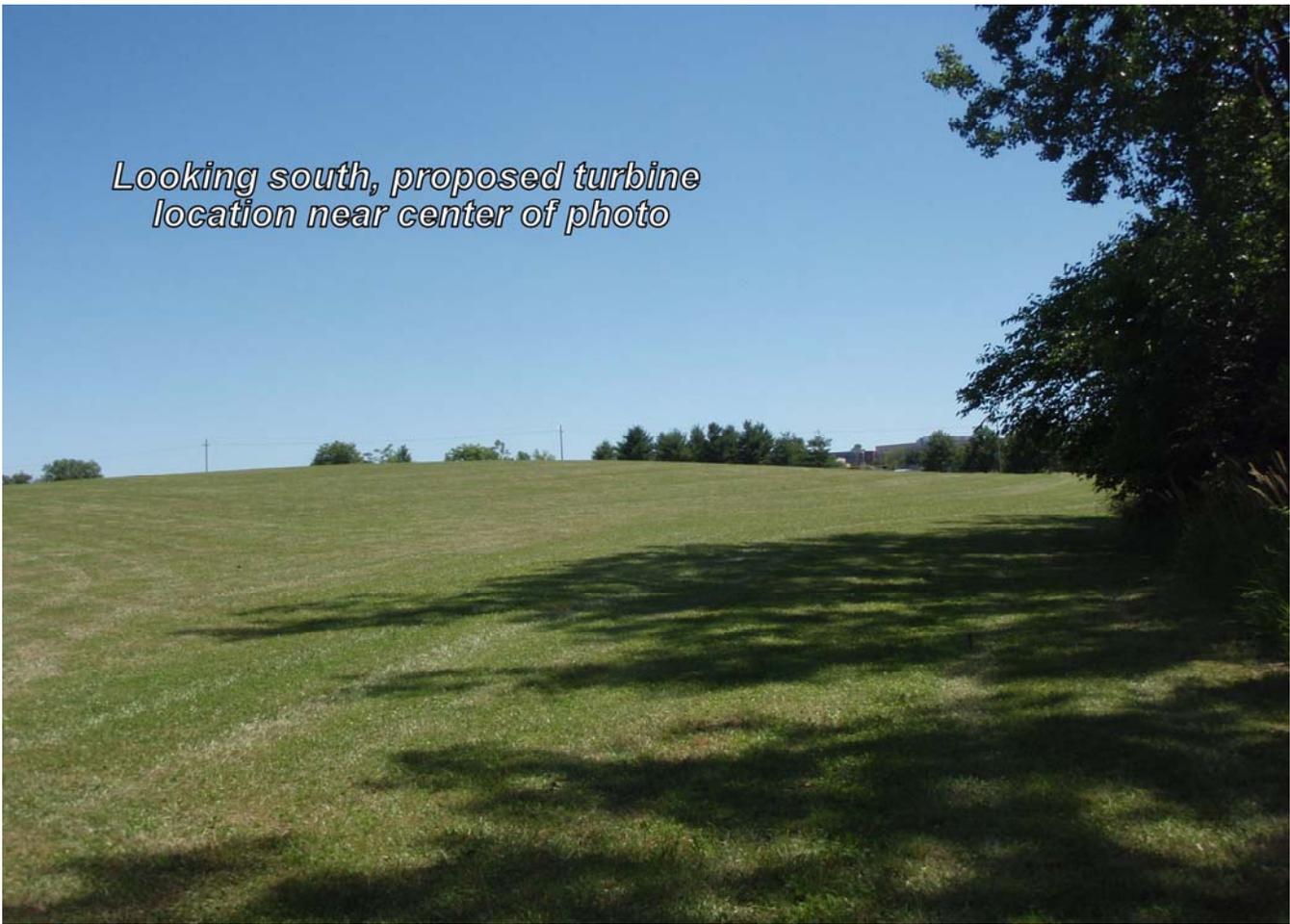
Site Photos

Looking west from proposed turbine location at forested area



Looking east, proposed turbine location near center of photo





Looking south, proposed turbine location near center of photo



Looking north, forested area west of proposed turbine at left. Maintained vacant area at right of photo

Looking south from road, forested stream north of project area



Small stream in forested area





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

AUG 27 2010

August 24, 2010

Mr. Ted McCaslin, Project Scientist
Howard R. Green Company
Court International Building
2550 University Avenue W, Suite 400N
St. Paul, Minnesota 55114

Dear Mr. McCaslin:

We have reviewed the Kirkwood Community College Wind Energy Facility Habitat Assessment (Assessment) regarding wind energy development project in Johnson County, Iowa. The report was dated July 2010. Kirkwood Community College plans to install a wind turbine at their main campus in Cedar Rapids, Iowa. The 2.5 megawatt wind turbine is 80 meters tall at the hub and has three rotors 50 meters in length. The Kirkwood Community College project is funded through a State Energy Program (SEP) grant from the Iowa Office of Energy Independence (OEI) and United States Department of Energy (DOE). As the grantor, DOE is the Federal action agency. We have the following comments.

We understand from the Assessment that there is no suitable habitat in the project area for the federally listed prairie bush clover (*Lespedeza leptostachya*) or western prairie fringed orchid (*Platanthera praeclara*). The project area is located in Linn County, Iowa, in a vacant field with mowed and maintained grass. We concur with your determination that the proposed project will have no effect on these species. The federally listed endangered Indiana bat (*Myotis sodalis*) is not listed for Linn County, but may migrate through the area.

Additionally, the placement of the turbine is not adjacent to any migratory areas, refuges, major flyways, or known avian nesting areas, and the turbine is of tubular monopole design. 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. This would also aid in our assessment of future wind power projects, test the assumptions we are currently making, and promote the conservation of bats, including the endangered Indiana bat. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated.

Mr. Ted McCaslin

2

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,

A handwritten signature in black ink, appearing to read "Richard C. Nelson". The signature is written in a cursive style with a large initial "R".

Richard C. Nelson
Field Supervisor

s:\office users\heidi\concernlaadoegrantsingleturbinekirkwoodcommcollege.doc

Preparer Checklist

Note: Any ground disturbing activities require consultation with the SHPO. Please fill out Part I and II of the "Request for SHPO Comment on a Project" form, under the archeology section, including all the requested information, and submit to OEI for review. Please fill out only one "Request for SHPO Comment on a Project" form for each project, (i.e. if you are disturbing ground *and* making physical alterations to a building on a project, fill out both portions of part II and submit all required information and documentation to OEI for review and comment).

- 1) The structure, object, or building, associated with this project is less than forty five (45) years of age *and* there are no ground disturbing activities.

If you checked box 1, please fill out the "Exempt from SHPO review" form. No further action is required – sign, and submit this form to OEI. If box one is NOT checked, please continue to number 2.

- 2) I am receiving Weatherization Assistance Program (WAP) funds.

If you checked box 2, please continue to box number 3. If you did not check box 2, please proceed to box 5.

- 3) All my project activities are included within Appendix A, either in sub-section A (exterior work), or/and sub-section B (interior work), and I have no ground disturbing activities associated with my project. [See pages 2-3 of this document]

If you checked box number 3, please stop and fill out the "Exempt from SHPO review" form. No further action is required – sign, and submit this form to OEI. If you did NOT check box 3, proceed to number 4.

- 4) A single work item, or numerous items, do not fit within the excluded activities specified in Appendix A, and/or I have ground disturbing activities. [See pages 4-6 of this document].

If you checked box number 4, please fill out the "Request for SHPO Comment on a Project" form along with all the requested information, documentation, and project specifications for review.

- 5) I am receiving either State Energy Program (SEP) and/or Energy Efficiency Community Block Grant (EECBG) funds for my project.

If box 5 is checked, please continue to box number 6. If box 5 is not applicable, and you are sure box 2 is also not applicable, then fill out the "Request for SHPO Comment on a Project" form along with all requested material and submit to OEI for review.

- 6) My project is excluded from review because all my activities are included in Appendix B *and* I have no ground disturbing activities. [See pages 4-6 of this document].

If box 6 is checked, stop and fill out the "Exempt from SHPO review" form. No further action is required – sign, and submit this form to OEI. If box 6 is NOT checked, please continue to number 7.

- 7) Not all my project activities for this project are excluded under Appendix B and/or I have ground disturbing activities associated with my project. [See pages 4-6 of this document]

If box 7 is checked please fill out the "Request for SHPO Comment on a Project" Form and submit it along with all the requested information for review, documentation, and project specifications to OEI for review.

Preparer's Name Ted McCaslin Signature *Ted McCaslin* Date 8/9/10

REQUEST FOR SHPO COMMENT ON A PROJECT

AUG 10 2010

Submit one copy with each property for which State Historic Preservation Office comment is requested. Please print or type.

- This is a new submittal
 This is more information relating to SHPO R&C #: _____

100857066

Instructions for completing this form are available online at www.iowahistory.org/preservation under "Review and Compliance". If you have questions while completing this form, please refer to the instructions before contacting your DOE project administrator or SHPO, as appropriate. Please attach a copy of the lead federal agency statement and/or the signature authorization form to your submittal, if applicable.

Cover Letter: Please include a cover letter with a comprehensive description of the Area of Potential Effect (APE) and project activities. The APE should include: the project area, all easements, borrowing areas, equipment and material storage, and staging areas. If applicable, describe excavation and other earthmoving activities including 3-dimensional parameters (length, width, and depth).

I. GENERAL INFORMATION

- a. Property Name: Kirkwood Wind Energy Facility
 b. Property Street & Number: 6301 Kirkwood Blvd SW
 c. County: Linn City: Cedar Rapids Zip: 52404
 d. Federal Agency: Dept of Energy Federal Funding Program/Permit: DE-F0A-0000052
 e. Agency Project No.: State Energy Program (SEP) #DE-EE000162
 f. Contact Person on Project: Thomas Kaldenberg Phone: 319-398-5569
 g. Contact Address: 6301 Kirkwood Blvd SW City: Cedar Rapids State: IA Zip: 52404
 e-mail: thomas.kaldenberg@kirkwood.edu

II. IDENTIFICATION OF HISTORIC PLACES

Please check the box/boxes indicating whether you are requesting an archeological and/or architectural review of your project. Provide all documentation and information requested, and forward to the Office of Energy Independence for review and SHPO coordination.

- Archeology
 7.5 min Quad U.S.G.S (1-mile radius) with quad name and APE outlined (maps on-line at www.ortho.gis.ia.state.edu)
 Site plan showing limits of proposed activities or general layout (engineering)
 Aerial photo: zoom to project area (photos on-line at www.ortho.gis.iastate.edu)
 Description of width and depth of proposed excavation and current conditions of project area
 OSA file search, Phase IA, or Phase I (whichever is appropriate)
 Number of acres in project: 4.5
 Legal location: Section(s) SW 1/4 of 15 Township(s) 82N Range(s): 07W
- Architecture
 Date of original construction for the building: _____
 Previous site information available (contact Iowa Site Inventory Coordinator)
 Update or new Iowa site Inventory Form (available online at www.iowahistory.org/preservation)
 Clear photos of property and surrounding area
 Location map (no bigger than 11x17) with the APE clearly defined (Quad map or city plat map)
 Copy of county or city assessor's card record or other appropriate property information
 Detailed description of proposed action, including copy of project specifications, if applicable

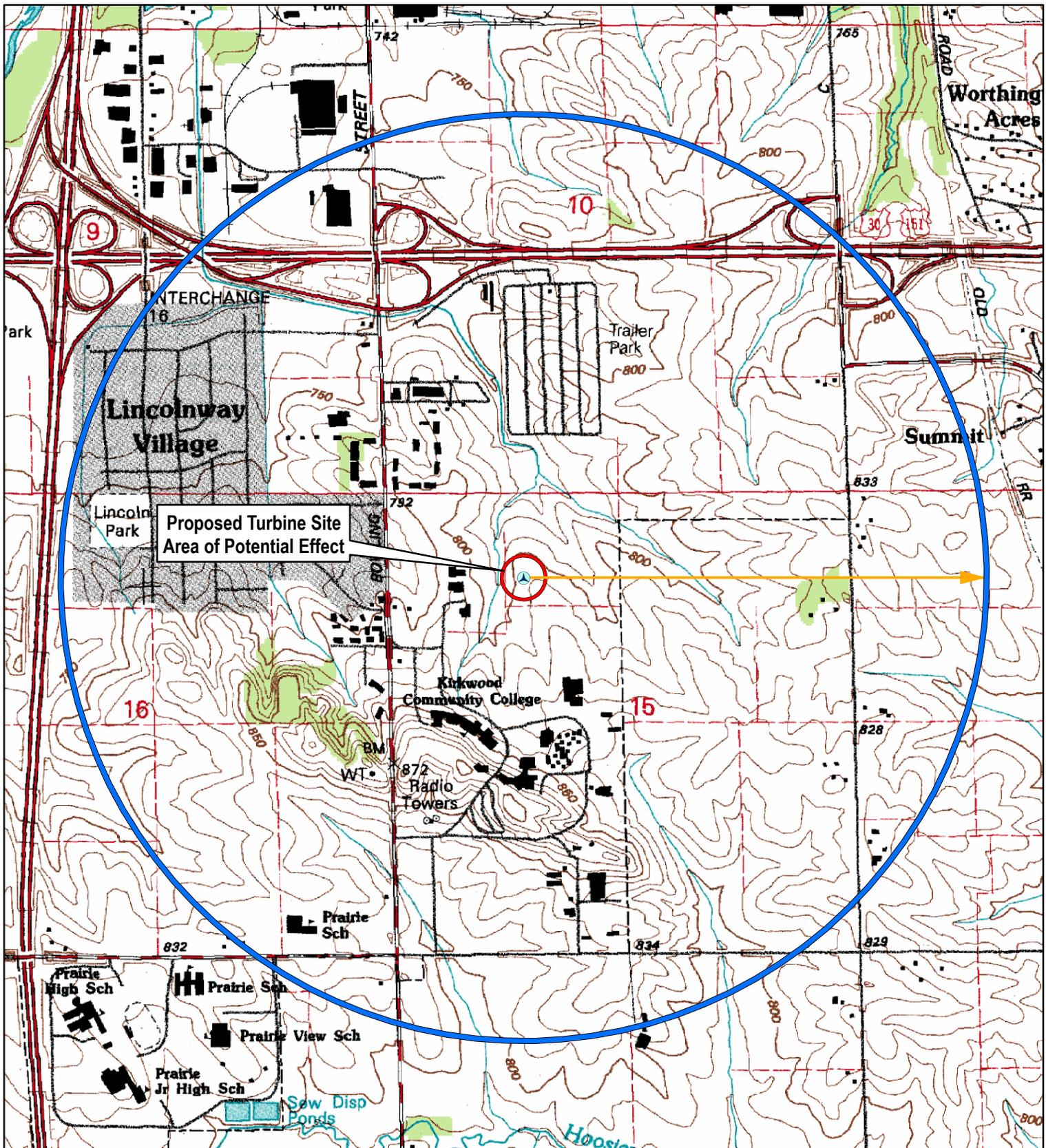
III. APPLICANT CERTIFICATION (TO BE COMPLETED BY OEI ONLY)

Determination of Effect (Check One)

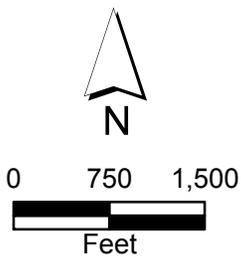
- No historic properties will be affected** (i.e., none are present or there are historic properties present but the project will have no effect upon them)
 No Adverse Effect to a historic property (i.e., a historic property is present and affected. However, the project either has no adverse effect on the historic property, or the applicant or other federally authorized representative will consult with the SHPO to modify the project or impose conditions to avoid adverse effects.)
 Adverse Effect to a historic property (i.e., a historic property is present and adversely affected. The applicant, or other federally authorized representative, will consult with the SHPO and other consulting parties to resolve the adverse effect.)

I understand that the SHPO has 30 days from receipt to object to the finding.

Federally Authorized Signature: *Kevin M. Sp...* Date: 10 AUG 10
 Type name below →



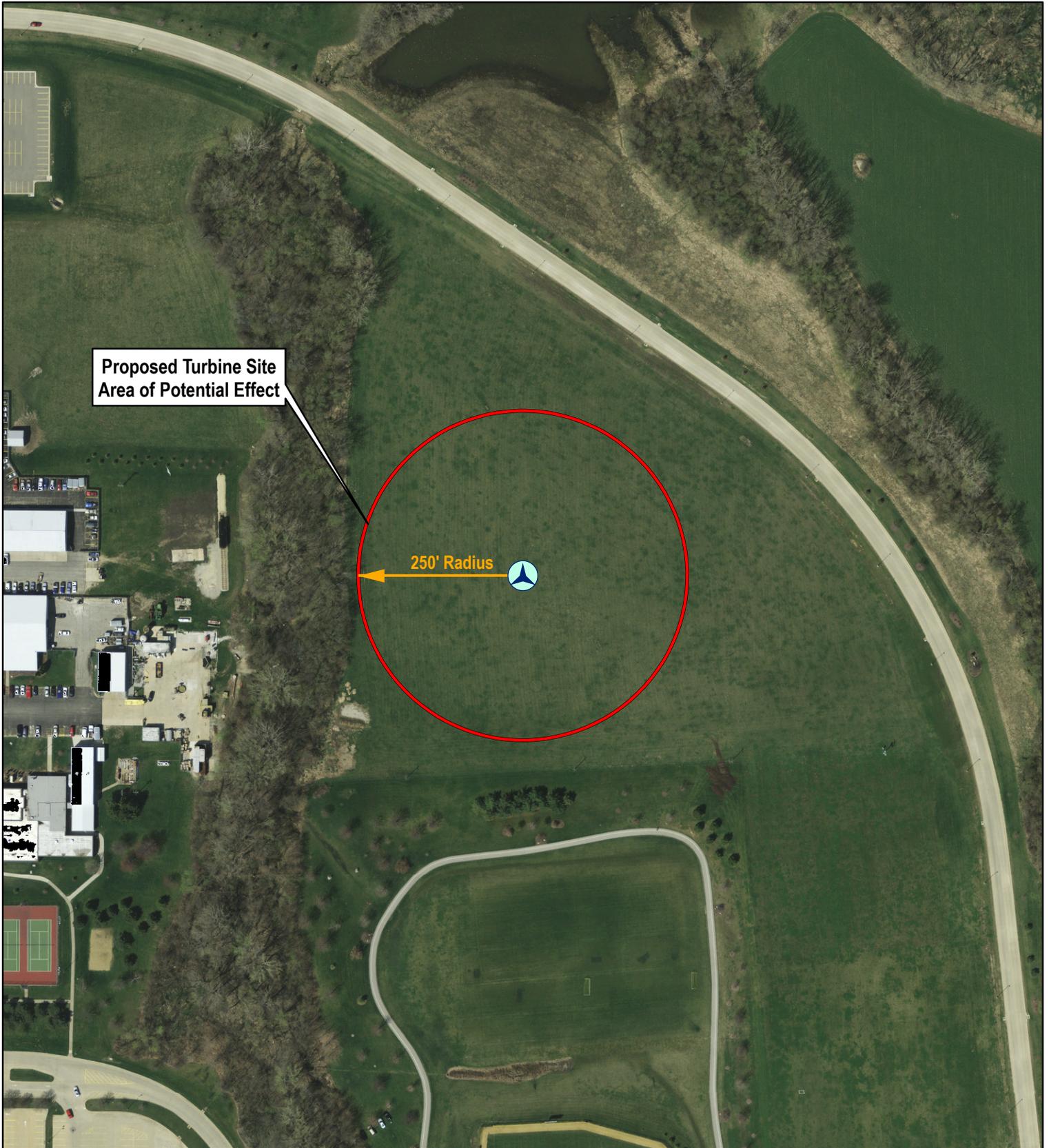
-  Area of Potential Effect (APE)
-  1-Mile Buffer of APE
-  Proposed Turbine Location
-  1-Mile Radius of Project Site



LOCATION MAP

Proposed Wind Facility
 Kirkwood Community College
 Cedar Rapids, Iowa

Source: USDA, NRCS
 Digital Raster Graphic Mosaic of Linn County, Iowa
 USGS 7.5' Quad Mosaic for Linn County, 2002



Proposed Turbine Site
Area of Potential Effect

250' Radius

 Area of Potential Effect (APE)

 Proposed Turbine Location

 250' Radius of Project Site



SITE PLAN & AERIAL PHOTO

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

Source: Linn County GIS
0.5-ft resolution aerial photo of Linn County, Iowa (2008)

 Howard R. Green Company

Description of width and depth of proposed excavation and current conditions of project area

Underground utilities to the wind turbine will require 6-8 feet wide by three feet deep trenching. Excavation material will be side cast and returned after installation of utilities. The turbine location will require 12-20 feet of below grade excavation depending on geotechnical considerations and turbine design. A total of 1-2 acres of ground disturbance is expected for the project.

The proposed turbine location is within a vacant area of the campus. The area is covered maintained turf grass and construction will not require the clearing of any trees or structures. Adjacent land use includes playing fields, a wooded creek area, campus buildings and vacant maintained campus land.

August 24, 2010

In response, refer to:

R&C #: **100857066**

RE: **DOE - CITY OF CEDAR RAPIDS - LINN COUNTY - KIRKWOOD WIND ENERGY FACILITY - DOE SEP #DE-EE000162 GRANT - STIMULUS FUNDS - PROPOSED INSTALLING 2.5MW WIND TURBINE - SEC. 15, T82N-R07W - 6301 KIRKWOOD BLVD SOUTHWEST - ADD'L INFORMATION - DETAILED MAP**

Dear Mr. Eppens:

We reviewed the information received in our office on 8/17/2010 concerning the proposed project for the above property. Thank you for providing the Iowa Historic Preservation Office (SHPO) with the opportunity to review this undertaking. We make the following comments and recommendations based on our examination of this material and in accordance with Section 106 of the National Historic Preservation Act of 1966; its implementing regulations, 36 CFR Part 800 (revised, effective August 5, 2004); and the Advisory Council on Historic Preservation's Policy Statement on Affordable Housing and Historic Preservation (adopted November 9, 2006).

We agree with your opinion that the property does not appear to be eligible for listing on the National Register of Historic Places. Therefore, we concur with your finding that No Historic Properties will be Affected by the proposed project.

If design changes involving undisturbed new rights-of-way or easements are made for this project, please forward additional information to our office for further comment along with the Agency Official's determination of effect. If project activities uncover any item(s) that might be of archaeological, historical, or architectural interest, or if important new archaeological, historical, or architectural data should be encountered in the project APE, the applicant should make reasonable efforts to avoid further impacts to the property until an assessment can be made by an individual meeting the Secretary of the Interior's professional qualifications standards (36 CFR Part 61).

We have made these comments and recommendations according to our responsibility defined by Federal law pertaining to the Section 106 process. Should you have any additional comments or questions, please contact me at jeremy.ammerman@iowa.gov or at 515.281.4129.

Sincerely,



Jeremy Ammerman, Architectural Historian
Iowa Historic Preservation Office

APPENDIX C

Noise Assessment

24-Hour Ambient Noise Survey

The proposed turbine is located on the Kirkwood Community College Main Campus in Cedar Rapids, Iowa. Three 24-monitoring period locations were selected to evaluate existing ambient noise in the proposed turbine area. Several Noise Sensitive Areas (NSAs) were identified near the proposed Kirkwood Wind Energy Facility during environmental scoping for the project. These NSAs include Kirkwood Estates, a mobile home park to north (Monitoring Location #1) and Kirkwood Courts (Monitoring Location #2), an apartment complex to the northwest. A third monitoring point was selected near the campus daycare facility, Kirkwood Kids, to the west of the proposed turbine (Monitoring Location #3).

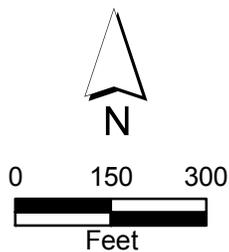
Three datalogging sound level meters (SLMs) were utilized at locations representative of the NSAs to capture ambient noise levels over a period of time. Each monitoring location was equipped with a Quest SoundPro SE/DL SLM and weather protection kit. Due to security concerns for the equipment, two of the locations were adjusted from their previously determined locations. The Kirkwood Courts location (#2) was relocated approximately 150 feet to the southeast to an overhead utility pole. The Kirkwood Kids Daycare location (#3) was relocated approximately 125 feet to the east to a light pole on the southwest corner of their parking lot. No adjustments were necessary at the Kirkwood Estates location (#1). The equipment was setup on Thursday, December 9, 2010 with the intent to run for 24 hours. Weather conditions during this period ranged from 19.9° Fahrenheit to 36.0° Fahrenheit, 64% to 91% humidity, 29.88 in Hg to 30.01 in Hg pressure, and 4.6 mph to 9.0 mph winds.

The SLM set up at the Kirkwood Kids Daycare location (#3) experienced a battery problem and subsequently shut down after only recording approximately five hours of data. The SLM set up at the Kirkwood Estates location (#1) recorded 18 hours of useable data before experiencing a localized noise anomaly which corrupted the remaining data. No problems were experienced at the Kirkwood Courts location (#2).

Based on the SLM data, the Kirkwood Estates location had an average noise level of 52.6 dB(A) based on 18 hours of data, the Kirkwood Courts location had an average noise level of 54.5 dB(A) based on 24 hours of data, and the Kirkwood Kids Daycare location had an average noise level of 54.7 dB(A) based on 5 hours of data.



-  Noise Monitoring Locations
-  Proposed Turbine Location



Ambient Noise Monitoring Locations
12/09/10-12/10/10

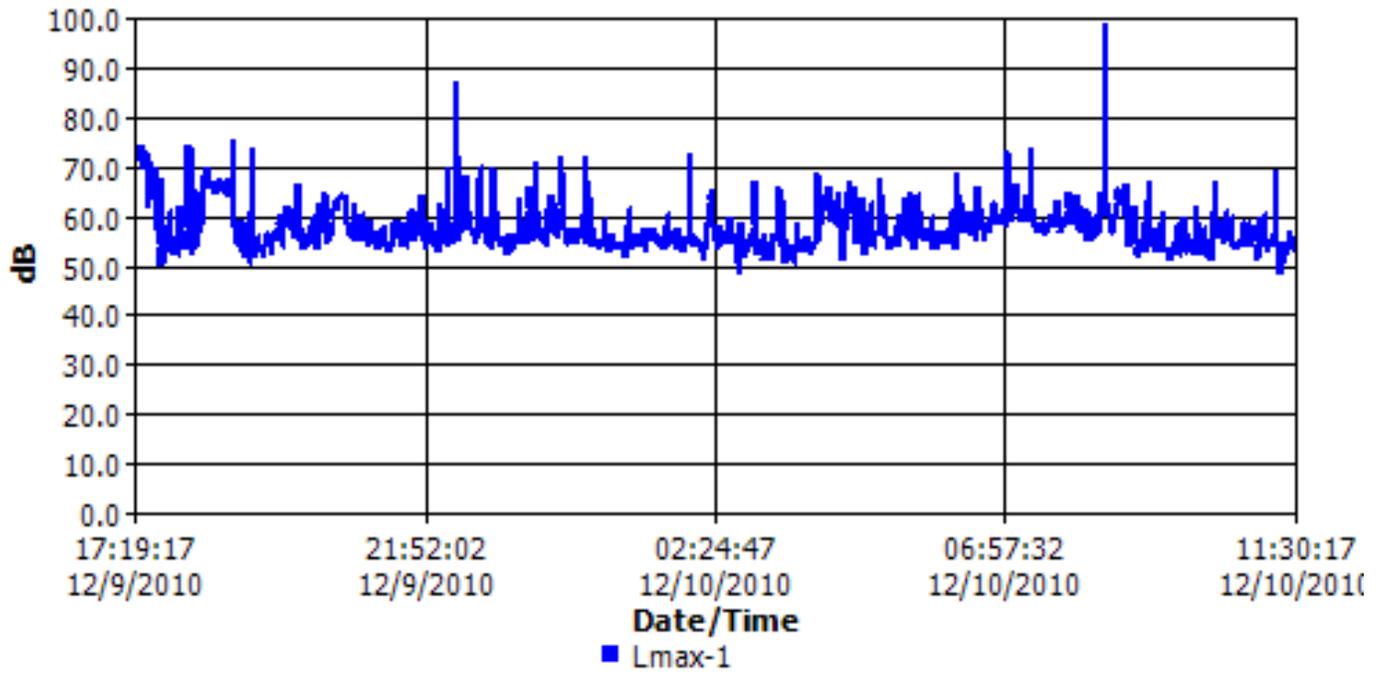
Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa



Kirkwood Estates

12/17/2010

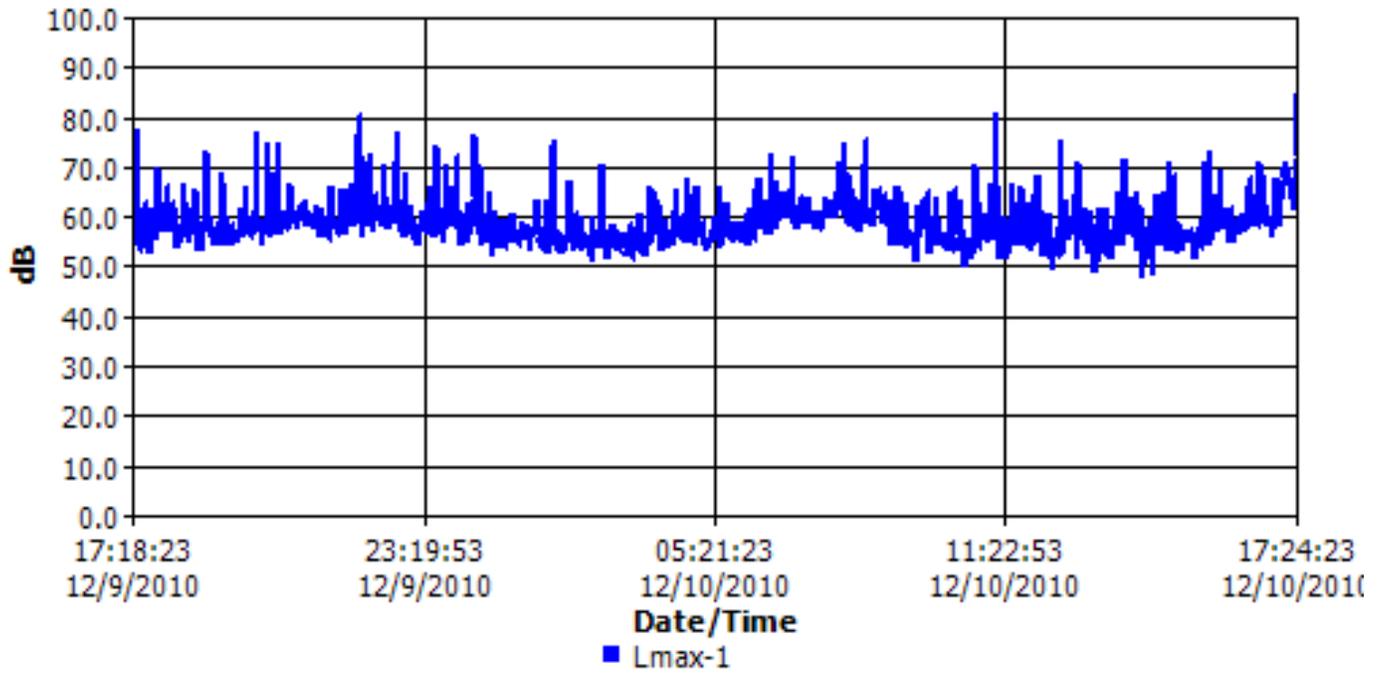
Logged Data Chart



Kirkwood Courts

12/17/2010

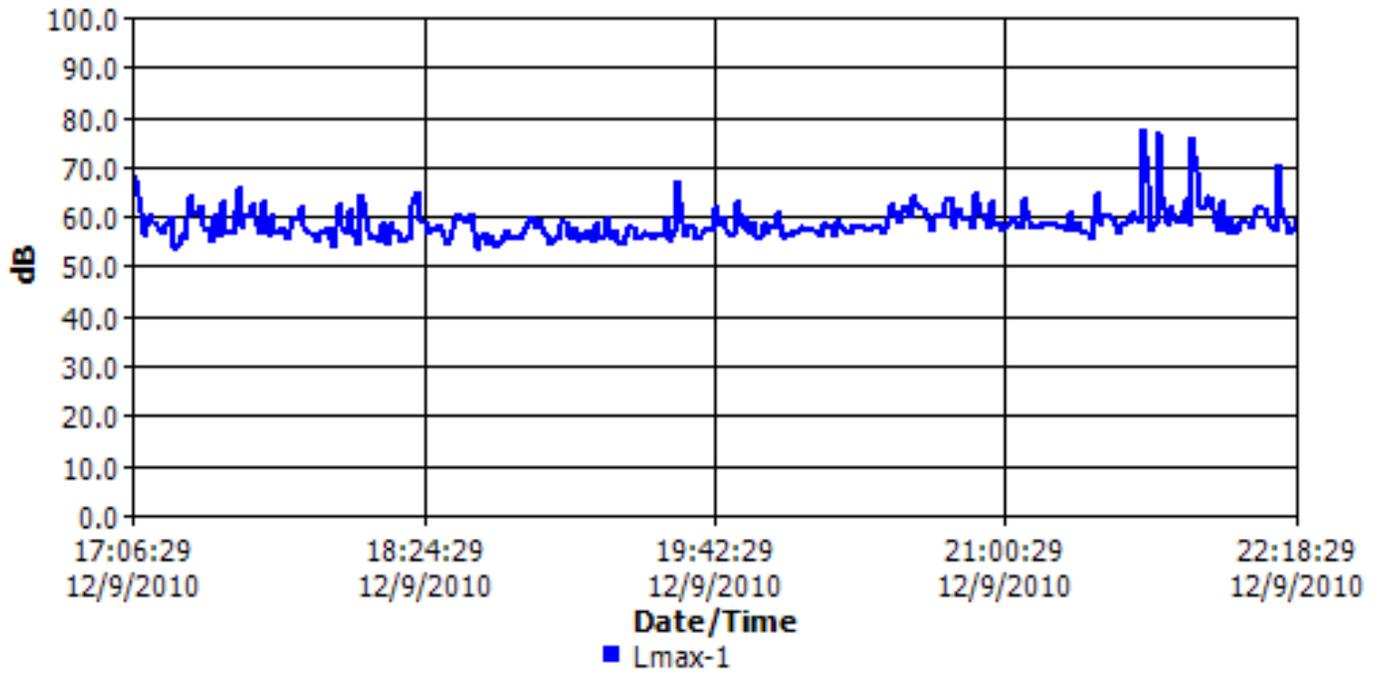
Logged Data Chart



Kirkwood Kids Daycare

12/17/2010

Logged Data Chart





Photograph 1 – Kirkwood Estates location facing North.



Photograph 2 – Kirkwood Estates location facing towards the proposed turbine.

Site Photographs

24-Hour Ambient Noise Study
Kirkwood Community NSAs
Cedar Rapids, IA

Photographed:

12-9-10

 Howard R. Green Company



Photograph 3 – Kirkwood Courts location facing North.



Photograph 4 – Kirkwood Courts location facing towards the proposed turbine.

Site Photographs

24-Hour Ambient Noise Study
Kirkwood Community NSAs
Cedar Rapids, IA

Photographed:

12-9-10

 Howard R. Green Company



Photograph 5 – Kirkwood Kids Daycare location facing North



Photograph 6 – Kirkwood Kids Daycare location facing towards the proposed turbine.

Site Photographs

24-Hour Ambient Noise Study
Kirkwood Community NSAs
Cedar Rapids, IA

Photographed:

12-9-10

 Howard R. Green Company

APPENDIX D

Shadow Flicker Assessment

Shadow Flicker Analysis

The WindPRO Version 2.7.473 SHADOW extension model was used to model shadow flicker to nearby properties from the proposed Kirkwood Wind Energy Facility. The model setup and assumptions for the shadow flicker analysis are described below. Results are shown on the attached SHADOW model report and GIS figures.

The turbine location is the same intersecting point (41-54-59.51N, 91-39-03.19W, NAD 83) as listed in the FAA Determination of No Hazard to Air Navigation for the project. The model used hub height (80 m) and rotor diameter (99 m) consistent with the Clipper CW99 Liberty 2500kW turbine. The Clipper CW99 was selected for the model because it is manufactured nearby and meets the proposed generation needs for the project.

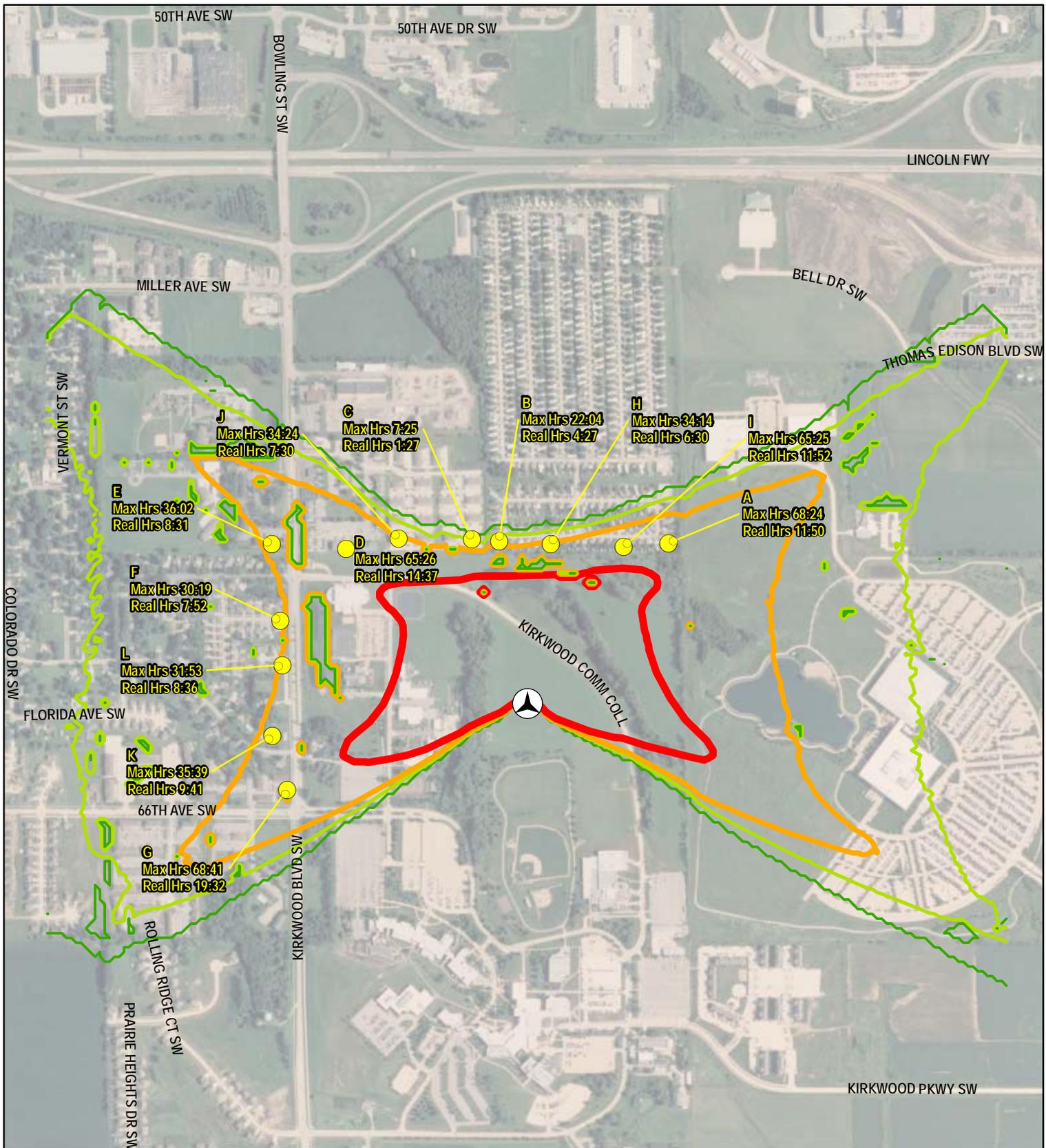
Adjacent land uses include commercial areas east of west of the proposed turbine, institutional areas west and south of the proposed turbine, and residential uses north and west of the proposed turbine. Cedar Rapids ordinances restrict the total annual shadow hours from wind turbine blade action on residential districts, but not on commercial or institutional districts.

Seven shadow receptors in residential districts near the turbine were selected and input into the model. Each receptor is assumed to have a single 2 x 2 meter window receptor and perpendicular (Green house direction mode in the model) to the shadow. Homes in the adjacent area include single family mobile homes (Receptors A, C, H & I), multiple unit apartments buildings (Receptors C, D, E, G, & J), single family houses (Receptors F & K), and duplexes (Receptor L).

Worst case (constant sunshine during daylight hours) and real case analysis (using average sunshine hours) flicker hours were modeled within SHADOW.

A number of assumptions were built into the SHADOW Model and are described below:

- Blade coverage – Shadow Flicker was only calculated when more than 20% of the sun disc is covered by the blade, the only time that flickering is an issue according to German guidelines. The German guidelines are the only known detailed guidelines for calculating shadow flicker at this time. (Also used for minimum sun height over horizon for influence assumption).
- Sunshine probability – Sunshine probability, used in the real case results only, was taken from the Madison, WI National Weather Service Station. The Madison station was the closest station with readily accessible and publically available sunshine hours.
- Annual operational time is assumed to be just below 80% or 6,970 hours a year.
- These hours are divided into 12 directional sectors and totaled based on a percentage ratio derived from a Wind Power Rose provided in a FirstLook Wind Assessment for the project.
- Elevation data was obtained from State of Iowa lidar data with a vertical accuracy of 18 cm.



● Shadow Receptor (Max Hours/Real Hours)

⊙ Proposed Turbine Location

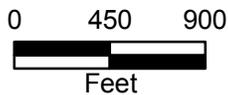
Worst Case Shadow Flicker Hours

— 1 Minute - 10 Hours

— 10 Hours - 30 Hours

— 30 Hours - 100 Hours

— Over 100 Hours



**WindPRO SHADOW Results
Worst Case Flicker Hours**

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa



J
Max Hrs 34:24
Real Hrs 7:30

C
Max Hrs 7:25
Real Hrs 1:27

B
Max Hrs 22:04
Real Hrs 4:27

H
Max Hrs 34:14
Real Hrs 6:30

I
Max Hrs 65:25
Real Hrs 11:52

E
Max Hrs 36:02
Real Hrs 8:31

F
Max Hrs 30:19
Real Hrs 7:52

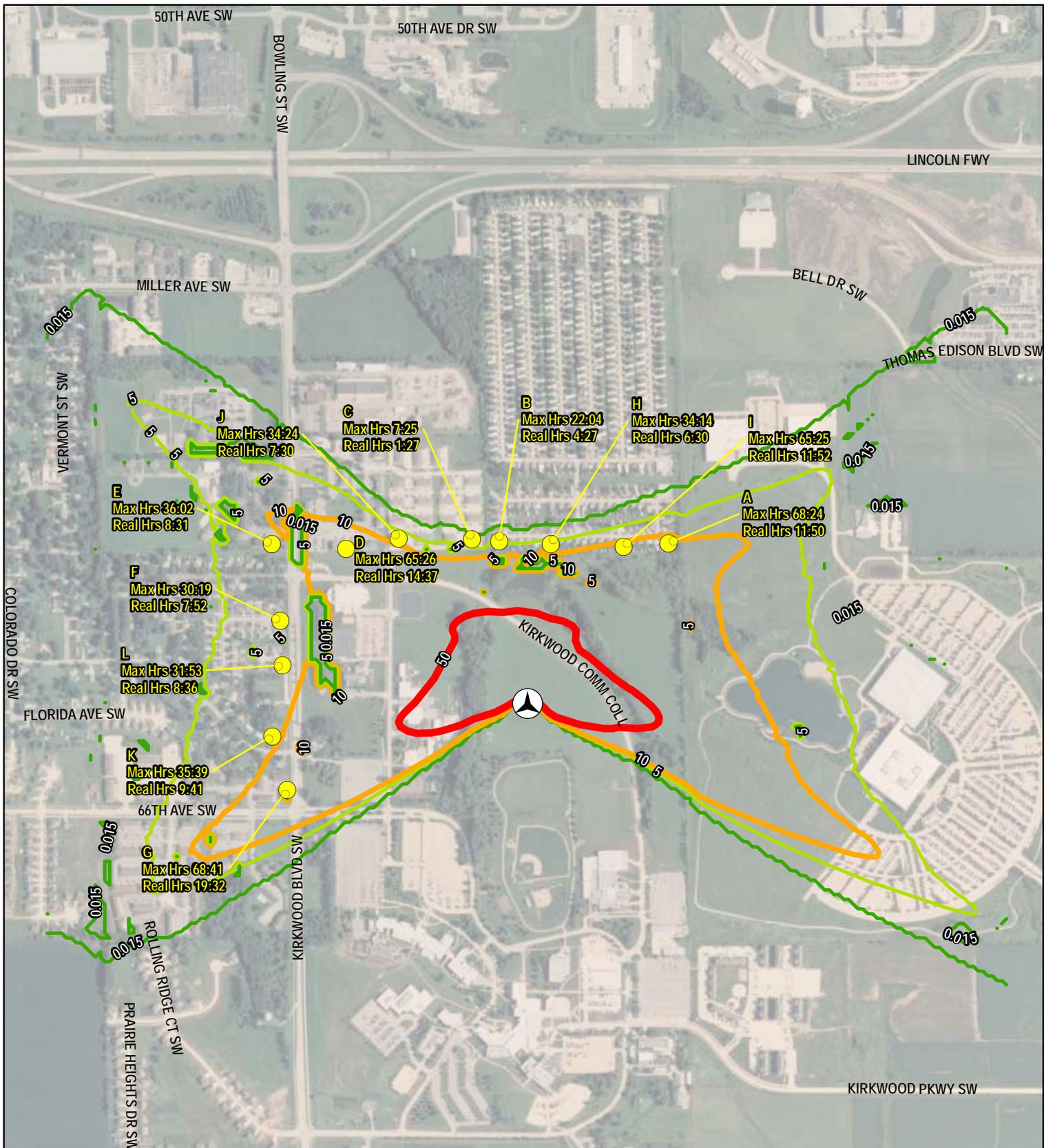
L
Max Hrs 31:53
Real Hrs 8:36

K
Max Hrs 35:39
Real Hrs 9:41

G
Max Hrs 68:41
Real Hrs 19:32

D
Max Hrs 65:26
Real Hrs 14:37

A
Max Hrs 68:24
Real Hrs 11:50

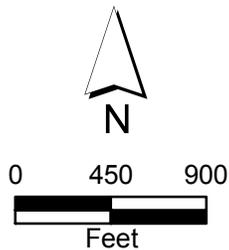


● Shadow Receptor (Max Hours/Real Hours)

⊙ Proposed Turbine Location

Real Case Shadow Flicker Hours

- 1 Minute - 5 Hours
- 5 Hours - 10 Hours
- 10 Hours - 50 Hours
- Over 50 Hours



**WindPRO SHADOW Results
Real Case Flicker Hours**

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa



Receptor Label	Max Hrs	Real Hrs
A	68:24	11:50
B	22:04	4:27
C	7:25	1:27
D	65:26	14:37
E	36:02	8:31
F	30:19	7:52
G	68:41	19:32
H	34:14	6:30
I	65:25	11:52
J	34:24	7:30
K	35:39	9:41
L	31:53	8:36

Project:

121310_Kirkwood Wind-Energy Facility

Printed/Page

12/15/2010 10:25 AM / 1

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Main Result

Assumptions for shadow calculations

Maximum distance for influence
 Calculate only when more than 20 % of sun is covered by the blade
 Please look in WTG table

Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.43	5.24	5.95	7.01	8.58	9.67	9.71	8.48	7.21	5.48	3.66	3.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	328	224	196	144	406	862	868	531	517	1,188	1,272	6,970

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: foot1.wpo (4)

Obstacles used in calculation

Eye height: 1.5 m

Grid resolution: 10 m



Scale 1:12,500

New WTG

Shadow receptor

WTGs

UTM NAD83 Zone: 15				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
UTM NAD83 Zone: 15 [m]											
1	611,880	4,641,399	807.9 CLIPPER CW99 Libert...	Yes	CLIPPER	CW99 Liberty-2,500	2,500	99.0	80.0	1,261	15.5

Shadow receptor-Input

UTM NAD83 Zone: 15											
No.	East	North	Z	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode		
A	612,176	4,641,733	785.4	2.0	2.0	1.0	-320.0	90.0	"Green house mode"		
B	611,822	4,641,737	773.2	2.0	2.0	1.0	0.0	90.0	"Green house mode"		
C	611,765	4,641,741	784.9	2.0	2.0	1.0	0.0	90.0	"Green house mode"		
D	611,503	4,641,722	800.6	2.0	2.0	1.0	0.0	90.0	"Green house mode"		
E	611,348	4,641,732	793.4	2.0	2.0	1.0	0.0	90.0	"Green house mode"		
F	611,365	4,641,572	780.9	2.0	2.0	1.0	0.0	90.0	"Green house mode"		
G	611,380	4,641,219	805.2	2.0	2.0	1.0	0.0	90.0	"Green house mode"		
H	611,930	4,641,731	771.3	2.0	2.0	1.0	-180.0	90.0	"Green house mode"		
I	612,082	4,641,725	778.0	2.0	2.0	1.0	-180.0	90.0	"Green house mode"		
J	611,612	4,641,743	800.0	2.0	2.0	1.0	-180.0	90.0	"Green house mode"		
K	611,349	4,641,331	798.9	2.0	2.0	1.0	-180.0	90.0	"Green house mode"		
L	611,370	4,641,478	781.0	2.0	1.0	2.0	-180.0	90.0	"Green house mode"		

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Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Main Result**Calculation Results**

Shadow receptor

No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
A	68:24	86	0:55	11:50
B	22:04	38	0:44	4:27
C	7:25	22	0:25	1:27
D	65:26	90	0:50	14:37
E	36:02	74	0:39	8:31
F	30:19	55	0:42	7:52
G	68:41	108	0:46	19:32
H	34:14	48	0:53	6:30
I	65:25	76	1:02	11:52
J	34:24	54	0:47	7:30
K	35:39	64	0:44	9:41
L	31:53	56	0:44	8:36

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	CLIPPER CW99 Liberty 2500 99.0 !O! hub: 80.0 m (3)	479:20	108:31

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Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 2.0 x 2.0 Azimuth: 40.0° Slope: 90.0° (9)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.43	5.24	5.95	7.01	8.58	9.67	9.71	8.48	7.21	5.48	3.66	3.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	328	224	196	144	406	862	868	531	517	1,188	1,272	6,970

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:35	14:44 (1) 07:20	15:14 (1) 06:43	06:51 06:04	05:35 05:35	06:00 06:32	07:03 06:39					07:15 14:31 (1)
	16:46 55	15:39 (1) 17:21	15:32 (1) 17:57	19:31 20:04	20:35 20:46	20:27 19:43	18:50 17:02					16:37 53 15:24 (1)
2	07:35	14:45 (1) 07:19	15:19 (1) 06:42	06:49 06:03	05:34 05:36	06:01 06:33	07:04 06:40					07:16 14:31 (1)
	16:47 55	15:40 (1) 17:23	15:28 (1) 17:58	19:32 20:05	20:35 20:46	20:26 19:42	18:48 17:01					16:37 54 15:25 (1)
3	07:35	14:45 (1) 07:18	06:40 06:48	06:02 06:02	05:34 05:36	06:02 06:34	07:05 06:41					07:17 14:32 (1)
	16:48 55	15:40 (1) 17:24	17:59 19:33	20:06 20:06	20:36 20:46	20:25 19:40	18:47 17:00					16:37 54 15:26 (1)
4	07:35	14:46 (1) 07:17	06:38 06:46	06:00 06:00	05:33 05:37	06:03 06:35	07:06 06:42					07:18 14:32 (1)
	16:49 55	15:41 (1) 17:25	18:00 19:34	20:07 20:07	20:37 20:46	20:24 19:38	18:45 16:58					16:36 55 15:27 (1)
5	07:35	14:46 (1) 07:16	06:37 06:44	05:59 05:59	05:33 05:37	06:04 06:36	07:08 06:44					07:19 14:33 (1)
	16:50 55	15:41 (1) 17:27	18:00 19:35	20:08 20:08	20:38 20:46	20:23 19:37	18:43 16:57					16:36 54 15:27 (1)
6	07:35	14:47 (1) 07:15	06:35 06:43	05:58 05:58	05:33 05:38	06:05 06:37	07:09 06:45					07:20 14:33 (1)
	16:51 55	15:42 (1) 17:28	18:01 19:36	20:09 20:09	20:38 20:46	20:22 19:35	18:41 16:56					16:36 55 15:28 (1)
7	07:35	14:46 (1) 07:14	06:34 06:41	05:57 05:57	05:32 05:39	06:06 06:38	07:10 06:46					07:21 14:33 (1)
	16:52 55	15:41 (1) 17:29	18:03 19:37	20:10 20:10	20:39 20:45	20:20 19:33	18:40 16:55					16:36 55 15:28 (1)
8	07:35	14:47 (1) 07:13	07:32 06:39	05:55 05:55	05:32 05:39	06:07 06:39	07:11 06:47					07:22 14:34 (1)
	16:53 55	15:42 (1) 17:30	18:04 19:39	20:12 20:12	20:40 20:45	20:19 19:32	18:38 16:54					16:36 55 15:29 (1)
9	07:35	14:48 (1) 07:12	07:30 06:38	05:54 05:54	05:32 05:40	06:08 06:40	07:12 06:49			14:49 (1)	07:23	14:33 (1)
	16:54 54	15:42 (1) 17:32	19:05 19:40	20:13 20:13	20:40 20:45	20:18 19:30	18:36 16:53	11	15:00 (1)	16:36	55	15:28 (1)
10	07:35	14:49 (1) 07:10	07:29 06:36	05:53 05:53	05:32 05:41	06:09 06:41	07:13 06:50			14:45 (1)	07:23	14:34 (1)
	16:55 54	15:43 (1) 17:33	19:06 19:41	20:14 20:14	20:41 20:44	20:17 19:28	18:35 16:52	18	15:03 (1)	16:36	55	15:29 (1)
11	07:34	14:49 (1) 07:09	07:27 06:34	05:52 05:51	05:31 05:41	06:10 06:42	07:14 06:51			14:43 (1)	07:24	14:34 (1)
	16:56 53	15:42 (1) 17:34	19:07 19:42	20:15 20:15	20:41 20:44	20:15 19:27	18:33 16:51	24	15:07 (1)	16:36	55	15:29 (1)
12	07:34	14:50 (1) 07:08	07:25 06:33	05:51 05:51	05:31 05:42	06:11 06:43	07:15 06:52			14:40 (1)	07:25	14:35 (1)
	16:57 53	15:43 (1) 17:36	19:08 19:43	20:16 20:16	20:42 20:43	20:14 19:25	18:32 16:50	29	15:09 (1)	16:36	55	15:30 (1)
13	07:34	14:51 (1) 07:07	07:24 06:31	05:50 05:50	05:31 05:43	06:12 06:44	07:16 06:54			14:38 (1)	07:26	14:35 (1)
	16:58 53	15:44 (1) 17:37	19:10 19:44	20:17 20:17	20:43 20:43	20:13 19:23	18:30 16:49	32	15:10 (1)	16:36	55	15:30 (1)
14	07:33	14:51 (1) 07:05	07:22 06:30	05:49 05:49	05:31 05:44	06:13 06:45	07:18 06:55			14:37 (1)	07:27	14:36 (1)
	16:59 52	15:43 (1) 17:38	19:11 19:45	20:18 20:18	20:43 20:42	20:11 19:21	18:28 16:48	34	15:11 (1)	16:36	55	15:31 (1)
15	07:33	14:52 (1) 07:04	07:20 06:28	05:48 05:48	05:31 05:44	06:14 06:46	07:19 06:56			14:36 (1)	07:27	14:36 (1)
	17:00 52	15:44 (1) 17:39	19:12 19:46	20:19 20:19	20:43 20:42	20:10 19:20	18:27 16:47	37	15:13 (1)	16:37	55	15:31 (1)
16	07:32	14:52 (1) 07:03	07:19 06:26	05:47 05:47	05:31 05:45	06:15 06:47	07:20 06:57			14:35 (1)	07:28	14:37 (1)
	17:02 52	15:44 (1) 17:41	19:13 19:47	20:20 20:20	20:44 20:41	20:08 19:18	18:25 16:46	39	15:14 (1)	16:37	55	15:32 (1)
17	07:32	14:53 (1) 07:01	07:17 06:25	05:46 05:46	05:31 05:46	06:16 06:49	07:21 06:58			14:34 (1)	07:29	14:37 (1)
	17:03 51	15:44 (1) 17:42	19:14 19:49	20:21 20:21	20:44 20:41	20:07 19:16	18:24 16:45	41	15:15 (1)	16:37	55	15:32 (1)
18	07:31	14:54 (1) 07:00	07:15 06:23	05:45 05:45	05:31 05:47	06:17 06:50	07:22 07:00			14:34 (1)	07:29	14:37 (1)
	17:04 50	15:44 (1) 17:43	19:15 19:50	20:22 20:22	20:45 20:40	20:05 19:14	18:22 16:44	42	15:16 (1)	16:37	55	15:32 (1)
19	07:31	14:54 (1) 06:58	07:13 06:22	05:44 05:44	05:31 05:48	06:18 06:51	07:23 07:01			14:33 (1)	07:30	14:38 (1)
	17:05 49	15:43 (1) 17:44	19:16 19:51	20:23 20:23	20:45 20:39	20:04 19:13	18:20 16:44	44	15:17 (1)	16:38	55	15:33 (1)
20	07:30	14:56 (1) 06:57	07:12 06:20	05:43 05:43	05:32 05:49	06:20 06:52	07:24 07:02			14:32 (1)	07:31	14:38 (1)
	17:06 48	15:44 (1) 17:46	19:17 19:52	20:24 20:24	20:45 20:38	20:02 19:11	18:19 16:43	46	15:18 (1)	16:38	55	15:33 (1)
21	07:30	14:56 (1) 06:55	07:10 06:19	05:42 05:42	05:32 05:50	06:21 06:53	07:26 07:03			14:31 (1)	07:31	14:39 (1)
	17:08 47	15:43 (1) 17:47	19:19 19:53	20:25 20:25	20:46 20:38	20:01 19:09	18:17 16:42	47	15:18 (1)	16:39	55	15:34 (1)
22	07:29	14:57 (1) 06:54	07:08 06:17	05:41 05:41	05:32 05:50	06:22 06:54	07:27 07:04			14:32 (1)	07:32	14:39 (1)
	17:09 46	15:43 (1) 17:48	19:20 19:54	20:26 20:26	20:46 20:37	19:59 19:07	18:16 16:41	48	15:20 (1)	16:39	55	15:34 (1)
23	07:28	14:58 (1) 06:53	07:07 06:16	05:40 05:40	05:32 05:51	06:23 06:55	07:28 07:06			14:31 (1)	07:32	14:40 (1)
	17:10 44	15:42 (1) 17:49	19:21 19:55	20:27 20:27	20:46 20:36	19:58 19:06	18:15 16:41	49	15:20 (1)	16:40	55	15:35 (1)
24	07:28	15:00 (1) 06:51	07:05 06:14	05:40 05:40	05:32 05:52	06:24 06:56	07:29 07:07			14:31 (1)	07:33	14:40 (1)
	17:11 42	15:42 (1) 17:51	19:22 19:56	20:28 20:28	20:46 20:35	19:56 19:04	18:13 16:40	50	15:21 (1)	16:40	55	15:35 (1)
25	07:27	15:01 (1) 06:49	07:03 06:13	05:39 05:39	05:33 05:53	06:25 06:57	07:30 07:08			14:30 (1)	07:33	14:41 (1)
	17:12 41	15:42 (1) 17:52	19:23 19:57	20:29 20:29	20:46 20:34	19:55 19:02	18:12 16:40	51	15:21 (1)	16:41	55	15:36 (1)
26	07:26	15:02 (1) 06:48	07:01 06:11	05:38 05:38	05:33 05:54	06:26 06:58	07:32 07:09			14:31 (1)	07:33	14:41 (1)
	17:14 39	15:41 (1) 17:53	19:24 19:58	20:30 20:30	20:46 20:33	19:53 19:00	18:10 16:39	52	15:23 (1)	16:41	55	15:36 (1)
27	07:25	15:03 (1) 06:46	07:00 06:10	05:37 05:37	05:33 05:55	06:27 06:59	07:33 07:10			14:31 (1)	07:34	14:42 (1)
	17:15 37	15:40 (1) 17:54	19:25 19:59	20:30 20:30	20:46 20:32	19:52 18:57	18:09 16:39	52	15:23 (1)	16:42	55	15:37 (1)
28	07:24	15:05 (1) 06:45	06:58 06:08	05:37 05:34	05:34 05:56	06:28 07:00	07:34 07:11			14:31 (1)	07:34	14:42 (1)
	17:16 34	15:39 (1) 17:55	19:26 19:59	20:31 20:31	20:47 20:32	19:50 18:55	18:07 16:38	52	15:23 (1)	16:43	55	15:37 (1)
29	07:23	15:07 (1) 06:43	06:56 06:07	05:36 05:34	05:34 05:57	06:29 07:01	07:35 07:12			14:31 (1)	07:34	14:43 (1)
	17:18 31	15:38 (1) 17:54	19:28 19:59	20:32 20:32	20:47 20:31	19:48 18:53	18:06 16:38	53	15:24 (1)	16:44	55	15:38 (1)
30	07:22	15:09 (1) 06:41	06:55 06:06	05:36 05:36	05:35 05:58	06:30 07:02	07:36 07:14			14:31 (1)	07:35	14:43 (1)
	17:19 27	15:36 (1) 17:52	19:29 19:59	20:33 20:33	20:46 20:30	19:47 18:52	18:05 16:37	53	15:24 (1)	16:44	55	15:38 (1)
31	07:21	15:11 (1) 06:39										

Project:

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 Calculated:
 12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (10)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:35	11:11 (1)	07:21	06:43	06:51	06:04	05:35	05:35	06:00	06:32	07:03	06:39	07:15
16:46	37	11:48 (1)	17:21	17:57	19:31	20:04	20:35	20:46	20:27	19:43	18:50	17:02	16:37
2	07:35	11:12 (1)	07:19	06:42	06:49	06:03	05:34	05:36	06:01	06:33	07:04	06:40	07:16
16:47	36	11:48 (1)	17:23	17:58	19:32	20:05	20:35	20:46	20:26	19:42	18:48	17:01	16:37
3	07:35	11:13 (1)	07:18	06:40	06:48	06:02	05:34	05:36	06:02	06:34	07:05	06:41	07:17
16:48	34	11:47 (1)	17:24	17:59	19:33	20:06	20:36	20:46	20:25	19:40	18:47	17:00	16:37
8	07:35	11:15 (1)	07:17	06:39	06:46	06:00	05:33	05:37	06:03	06:35	07:07	06:42	07:18
16:49	31	11:46 (1)	17:25	18:00	19:34	20:07	20:37	20:46	20:24	19:38	18:45	16:58	16:36
17	07:35	11:20 (1)	07:14	06:34	06:41	05:57	05:32	05:39	06:06	06:38	07:10	06:46	07:21
16:51	27	11:45 (1)	17:28	18:01	19:36	20:09	20:38	20:46	20:22	19:35	18:41	16:56	16:36
7	07:35	11:20 (1)	07:14	06:34	06:41	05:57	05:32	05:39	06:06	06:38	07:10	06:46	07:21
16:52	22	11:42 (1)	17:29	18:03	19:37	20:10	20:39	20:45	20:20	19:33	18:40	16:55	16:36
8	07:35	11:23 (1)	07:13	07:32	06:39	05:55	05:32	05:39	06:07	06:39	07:11	06:47	07:22
16:53	17	11:40 (1)	17:30	18:04	19:39	20:12	20:40	20:45	20:19	19:32	18:38	16:54	16:36
9	07:35	11:27 (1)	07:12	07:30	06:38	05:54	05:32	05:40	06:08	06:40	07:12	06:49	07:23
16:54	9	11:36 (1)	17:32	19:05	19:40	20:13	20:40	20:45	20:18	19:30	18:36	16:53	16:36
10	07:35		07:10	07:29	06:36	05:53	05:32	05:41	06:09	06:41	07:13	06:50	07:23
16:55		17:33	19:06	19:41	20:14	20:41	20:44	20:17	19:28	18:35	16:52	16:36	36
11	07:34		07:09	07:27	06:34	05:52	05:31	05:41	06:10	06:42	07:14	06:51	07:24
16:56		17:34	19:07	19:42	20:15	20:41	20:44	20:15	19:27	18:33	16:51	16:36	37
12	07:34		07:08	07:25	06:33	05:51	05:31	05:42	06:11	06:43	07:15	06:52	07:25
16:57		17:36	19:08	19:43	20:16	20:42	20:43	20:14	19:25	18:32	16:50	16:36	38
13	07:34		07:07	07:24	06:31	05:50	05:31	05:43	06:12	06:44	07:16	06:54	07:26
16:58		17:37	19:10	19:44	20:17	20:43	20:43	20:13	19:23	18:30	16:49	16:36	40
14	07:33		07:05	07:22	06:30	05:49	05:31	05:44	06:13	06:45	07:18	06:55	07:27
16:59		17:38	19:11	19:45	20:18	20:43	20:42	20:11	19:21	18:28	16:48	16:36	41
15	07:33		07:04	07:20	06:28	05:48	05:31	05:44	06:14	06:46	07:19	06:56	07:27
17:00		17:39	19:12	19:46	20:19	20:43	20:42	20:10	19:20	18:27	16:47	16:37	42
16	07:32		07:03	07:19	06:26	05:47	05:31	05:45	06:15	06:47	07:20	06:57	07:28
17:02		17:41	19:13	19:47	20:20	20:44	20:41	20:08	19:18	18:25	16:46	16:37	42
17	07:32		07:01	07:17	06:25	05:46	05:31	05:46	06:16	06:49	07:21	06:58	07:29
17:03		17:42	19:14	19:49	20:21	20:44	20:41	20:07	19:16	18:24	16:45	16:37	43
18	07:31		07:00	07:15	06:23	05:45	05:31	05:47	06:17	06:50	07:22	07:00	07:29
17:04		17:43	19:15	19:50	20:22	20:45	20:40	20:05	19:14	18:22	16:44	16:37	43
19	07:31		06:58	07:13	06:22	05:44	05:31	05:48	06:18	06:51	07:23	07:01	07:30
17:05		17:44	19:16	19:51	20:23	20:45	20:39	20:04	19:13	18:21	16:44	16:38	43
20	07:30		06:57	07:12	06:20	05:43	05:32	05:49	06:20	06:52	07:24	07:02	07:31
17:06		17:46	19:17	19:52	20:24	20:45	20:38	20:02	19:11	18:19	16:43	16:38	44
21	07:30		06:55	07:10	06:19	05:42	05:32	05:50	06:21	06:53	07:26	07:03	07:31
17:08		17:47	19:19	19:53	20:25	20:46	20:38	20:01	19:09	18:17	16:42	16:39	44
22	07:29		06:54	07:08	06:17	05:41	05:32	05:50	06:22	06:54	07:27	07:04	07:32
17:09		17:48	19:20	19:54	20:26	20:46	20:37	19:59	19:07	18:16	16:41	16:39	44
23	07:28		06:53	07:07	06:16	05:40	05:32	05:51	06:23	06:55	07:28	07:06	07:32
17:10		17:49	19:21	19:55	20:27	20:46	20:36	19:58	19:06	18:15	16:41	16:40	44
24	07:28		06:51	07:05	06:14	05:40	05:32	05:52	06:24	06:56	07:29	07:07	07:33
17:11		17:51	19:22	19:56	20:28	20:46	20:35	19:56	19:04	18:13	16:40	16:40	43
25	07:27		06:50	07:03	06:13	05:39	05:33	05:53	06:25	06:57	07:30	07:08	07:33
17:13		17:52	19:23	19:57	20:29	20:46	20:34	19:55	19:02	18:12	16:40	16:41	43
26	07:26		06:48	07:01	06:11	05:38	05:33	05:54	06:26	06:58	07:32	07:09	07:33
17:14		17:53	19:24	19:58	20:30	20:46	20:33	19:53	19:00	18:10	16:39	16:42	43
27	07:25		06:46	07:00	06:10	05:38	05:33	05:55	06:27	06:59	07:33	07:10	07:34
17:15		17:54	19:25	20:00	20:30	20:46	20:33	19:52	18:57	18:09	16:39	16:42	42
28	07:24		06:45	06:58	06:08	05:37	05:34	05:56	06:28	07:00	07:34	07:11	07:34
17:16		17:55	19:26	20:01	20:31	20:47	20:32	19:50	18:55	18:07	16:38	16:43	42
29	07:23		06:44	06:57	06:07	05:36	05:34	05:57	06:29	07:01	07:35	07:12	07:34
17:18			19:28	20:02	20:32	20:47	20:31	19:48	18:53	18:06	16:38	16:44	41
30	07:22		06:43	06:56	06:06	05:36	05:35	05:58	06:30	07:02	07:36	07:14	07:35
17:19			19:29	20:03	20:33	20:46	20:30	19:47	18:52	18:05	16:37	16:44	40
31	07:21		06:42	06:55	06:05	05:35	05:34	05:59	06:31	07:03	07:38	07:15	07:35
17:20			19:30	20:04	20:34	20:46	20:28	19:45	19:45	18:03	16:45	16:45	39
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285	1081
Total, worst case		243											0.80
Sun reduction		0.47											0.35
Oper. time red.		0.80											0.80
Wind dir. red.		0.69											0.69
Total reduction		0.26											0.19
Total, real		62											206

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 5

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (11)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:35	10:43 (1)	07:21	06:43	06:51	06:04	05:35	05:35	06:00	06:32	07:03	06:39	07:15
16:46	9	10:52 (1)	17:21	17:57	19:31	20:04	20:35	20:46	20:27	19:43	18:50	17:02	16:37
2	07:35		07:20	06:42	06:49	06:03	05:34	05:36	06:01	06:33	07:04	06:40	07:16
16:47			17:23	17:58	19:32	20:05	20:35	20:46	20:26	19:42	18:48	17:01	16:37
3	07:35		07:18	06:40	06:48	06:02	05:34	05:36	06:02	06:34	07:05	06:41	07:17
16:48			17:24	17:59	19:33	20:06	20:36	20:46	20:25	19:40	18:47	17:00	16:37
4	07:35		07:17	06:39	06:46	06:00	05:33	05:37	06:03	06:35	07:07	06:42	07:18
16:49			17:25	18:00	19:34	20:07	20:37	20:46	20:24	19:38	18:45	16:58	16:36
5	07:35		07:16	06:37	06:44	05:59	05:33	05:37	06:04	06:36	07:08	06:44	07:19
16:50			17:27	18:00	19:35	20:08	20:38	20:46	20:23	19:37	18:43	16:57	16:36
6	07:35		07:15	06:35	06:43	05:58	05:33	05:38	06:05	06:37	07:09	06:45	07:20
16:51			17:28	18:01	19:36	20:09	20:38	20:46	20:22	19:35	18:41	16:56	16:36
7	07:35		07:14	06:34	06:41	05:57	05:32	05:39	06:06	06:38	07:10	06:46	07:21
16:52			17:29	18:03	19:38	20:10	20:39	20:45	20:20	19:33	18:40	16:55	16:36
8	07:35		07:13	07:32	06:39	05:55	05:32	05:39	06:07	06:39	07:11	06:47	07:22
16:53			17:30	18:04	19:39	20:12	20:40	20:45	20:19	19:32	18:38	16:54	16:36
9	07:35		07:12	07:30	06:38	05:54	05:32	05:40	06:08	06:40	07:12	06:49	07:23
16:54			17:32	19:05	19:40	20:13	20:40	20:45	20:18	19:30	18:36	16:53	16:36
10	07:35		07:10	07:29	06:36	05:53	05:32	05:41	06:09	06:41	07:13	06:50	07:23
16:55			17:33	19:06	19:41	20:14	20:41	20:44	20:17	19:28	18:35	16:52	16:36
11	07:34		07:09	07:27	06:34	05:52	05:31	05:41	06:10	06:42	07:14	06:51	07:24
16:56			17:34	19:07	19:42	20:15	20:41	20:44	20:15	19:27	18:33	16:51	16:36
12	07:34		07:08	07:25	06:33	05:51	05:31	05:42	06:11	06:43	07:15	06:52	07:25
16:57			17:36	19:08	19:43	20:16	20:42	20:43	20:14	19:25	18:32	16:50	16:36
13	07:34		07:07	07:24	06:31	05:50	05:31	05:43	06:12	06:44	07:16	06:54	07:26
16:58			17:37	19:10	19:44	20:17	20:43	20:43	20:13	19:23	18:30	16:49	16:36
14	07:33		07:05	07:22	06:30	05:49	05:31	05:44	06:13	06:45	07:18	06:55	07:27
16:59			17:38	19:11	19:45	20:18	20:43	20:42	20:11	19:21	18:28	16:48	16:36
15	07:33		07:04	07:20	06:28	05:48	05:31	05:44	06:14	06:46	07:19	06:56	07:27
17:00			17:39	19:12	19:46	20:19	20:43	20:42	20:10	19:20	18:27	16:47	16:37
16	07:32		07:03	07:19	06:26	05:47	05:31	05:45	06:15	06:47	07:20	06:57	07:28
17:02			17:41	19:13	19:47	20:20	20:44	20:41	20:08	19:18	18:25	16:46	16:37
17	07:32		07:01	07:17	06:25	05:46	05:31	05:46	06:16	06:49	07:21	06:58	07:29
17:03			17:42	19:14	19:49	20:21	20:44	20:41	20:07	19:16	18:24	16:45	16:37
18	07:31		07:00	07:15	06:23	05:45	05:31	05:47	06:17	06:50	07:22	07:00	07:29
17:04			17:43	19:15	19:50	20:22	20:45	20:40	20:05	19:14	18:22	16:44	16:37
19	07:31		06:58	07:13	06:22	05:44	05:31	05:48	06:18	06:51	07:23	07:01	07:30
17:05			17:44	19:16	19:51	20:23	20:45	20:39	20:04	19:13	18:21	16:44	16:38
20	07:30		06:57	07:12	06:20	05:43	05:32	05:49	06:20	06:52	07:24	07:02	07:31
17:06			17:46	19:18	19:52	20:24	20:45	20:38	20:02	19:11	18:19	16:43	16:38
21	07:30		06:55	07:10	06:19	05:42	05:32	05:50	06:21	06:53	07:26	07:03	07:31
17:08			17:47	19:19	19:53	20:25	20:46	20:38	20:01	19:09	18:17	16:42	16:39
22	07:29		06:54	07:08	06:17	05:41	05:32	05:50	06:22	06:54	07:27	07:04	07:32
17:09			17:48	19:20	19:54	20:26	20:46	20:37	19:59	19:07	18:16	16:41	16:39
23	07:28		06:53	07:07	06:16	05:40	05:32	05:51	06:23	06:55	07:28	07:06	07:32
17:10			17:49	19:21	19:55	20:27	20:46	20:36	19:58	19:06	18:15	16:41	16:40
24	07:28		06:51	07:05	06:14	05:40	05:32	05:52	06:24	06:56	07:29	07:07	07:33
17:11			17:51	19:22	19:56	20:28	20:46	20:35	19:56	19:04	18:13	16:40	16:40
25	07:27		06:50	07:03	06:13	05:39	05:33	05:53	06:25	06:57	07:30	07:08	07:33
17:13			17:52	19:23	19:57	20:29	20:46	20:34	19:55	19:02	18:12	16:40	16:41
26	07:26		06:48	07:01	06:11	05:38	05:33	05:54	06:26	06:58	07:32	07:09	07:33
17:14			17:53	19:24	19:58	20:30	20:46	20:33	19:53	19:00	18:10	16:39	16:42
27	07:25		06:46	07:00	06:10	05:38	05:33	05:55	06:27	06:59	07:33	07:10	07:34
17:15			17:54	19:25	20:00	20:30	20:46	20:33	19:52	18:57	18:09	16:39	16:42
28	07:24		06:45	06:58	06:08	05:37	05:34	05:56	06:28	07:00	07:34	07:11	07:34
17:16			17:55	19:26	20:01	20:31	20:47	20:32	19:50	18:55	18:07	16:38	16:43
29	07:23			06:56	06:07	05:36	05:34	05:57	06:29	07:01	07:35	07:12	07:34
17:18				19:28	20:02	20:32	20:47	20:31	19:48	18:53	18:06	16:38	16:44
30	07:22			06:55	06:06	05:36	05:35	05:58	06:30	07:02	07:36	07:14	07:35
17:19				19:29	20:03	20:33	20:46	20:30	19:47	18:52	18:05	16:37	16:44
31	07:22			06:53		05:35		05:59	06:31		07:38		07:35
17:20				19:30		20:34		20:28	19:45		18:03		16:45
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285	436
Total, worst case		9											0.35
Sun reduction		0.47											0.80
Oper. time red.		0.80											0.70
Wind dir. red.		0.70											0.19
Total reduction		0.26											0.85
Total, real		2											

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 6

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (12)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.43	5.24	5.95	7.01	8.58	9.67	9.71	8.48	7.21	5.48	3.66	3.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	328	224	196	144	406	862	868	531	517	1,188	1,272	6,970

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:35	08:14 (1) 07:21	08:34 (1) 06:43	06:51 06:04	05:35 05:35	06:00 06:32	07:03 06:39	07:15	07:59 (1)	07:15	07:59 (1)	07:59 (1)
2	07:35	08:14 (1) 07:20	08:37 (1) 06:42	06:49 06:03	05:34 05:36	06:01 06:33	07:04 06:40	07:16	08:00 (1)	07:16	08:00 (1)	08:00 (1)
3	07:35	08:14 (1) 07:18	08:40 (1) 06:40	06:48 06:02	05:34 05:36	06:02 06:34	07:05 06:41	07:17	08:01 (1)	07:17	08:01 (1)	08:01 (1)
4	07:35	08:15 (1) 07:17	08:45 (1) 06:39	06:46 06:00	05:33 05:37	06:03 06:35	07:07 06:43	07:18	08:01 (1)	07:18	08:01 (1)	08:01 (1)
5	07:35	08:16 (1) 07:16	08:50 (1) 06:37	06:44 05:59	05:33 05:37	06:04 06:36	07:08 06:44	07:19	08:01 (1)	07:19	08:01 (1)	08:01 (1)
6	07:35	08:16 (1) 07:15	08:00 06:35	06:43 05:58	05:33 05:38	06:05 06:37	07:09 06:45	07:20	08:02 (1)	07:20	08:02 (1)	08:02 (1)
7	07:35	08:16 (1) 07:14	08:01 06:34	06:41 05:57	05:32 05:39	06:06 06:38	07:10 06:46	07:21	08:02 (1)	07:21	08:02 (1)	08:02 (1)
8	07:35	08:16 (1) 07:13	08:03 06:32	06:39 05:55	05:32 05:39	06:07 06:39	07:11 06:47	07:22	08:03 (1)	07:22	08:03 (1)	08:03 (1)
9	07:35	08:17 (1) 07:12	08:04 06:30	06:38 05:54	05:32 05:40	06:08 06:40	07:12 06:49	07:23	08:04 (1)	07:23	08:04 (1)	08:04 (1)
10	07:35	08:17 (1) 07:10	08:05 06:29	06:36 05:53	05:32 05:45	06:09 06:41	07:13 06:50	07:23	08:05 (1)	07:23	08:05 (1)	08:05 (1)
11	07:34	08:17 (1) 07:09	08:06 06:27	06:34 05:52	05:31 05:41	06:10 06:42	07:14 06:51	07:24	08:06 (1)	07:24	08:06 (1)	08:06 (1)
12	07:34	08:18 (1) 07:08	08:07 06:25	06:33 05:51	05:31 05:42	06:11 06:43	07:15 06:52	07:25	08:07 (1)	07:25	08:07 (1)	08:07 (1)
13	07:34	08:19 (1) 07:07	08:08 06:24	06:31 05:50	05:31 05:43	06:12 06:44	07:16 06:54	07:26	08:08 (1)	07:26	08:08 (1)	08:08 (1)
14	07:33	08:19 (1) 07:05	08:09 06:22	06:30 05:49	05:31 05:44	06:13 06:45	07:18 06:55	07:27	08:09 (1)	07:27	08:09 (1)	08:09 (1)
15	07:33	08:20 (1) 07:04	08:10 06:21	06:28 05:48	05:31 05:44	06:14 06:46	07:19 06:56	07:28	08:10 (1)	07:28	08:10 (1)	08:10 (1)
16	07:32	08:20 (1) 07:03	08:11 06:20	06:26 05:47	05:31 05:42	06:15 06:48	07:20 06:57	07:29	08:11 (1)	07:29	08:11 (1)	08:11 (1)
17	07:32	08:21 (1) 07:01	08:12 06:19	06:25 05:46	05:31 05:46	06:16 06:49	07:21 06:58	07:30	08:12 (1)	07:30	08:12 (1)	08:12 (1)
18	07:31	08:21 (1) 07:00	08:13 06:18	06:24 05:45	05:31 05:47	06:17 06:50	07:22 07:00	07:31	08:13 (1)	07:31	08:13 (1)	08:13 (1)
19	07:31	08:22 (1) 06:58	08:14 06:17	06:23 05:44	05:31 05:48	06:18 06:51	07:23 07:01	07:32	08:14 (1)	07:32	08:14 (1)	08:14 (1)
20	07:30	08:22 (1) 06:57	08:15 06:16	06:22 05:43	05:32 05:49	06:19 06:52	07:24 07:02	07:33	08:15 (1)	07:33	08:15 (1)	08:15 (1)
21	07:30	08:23 (1) 06:55	08:16 06:15	06:21 05:42	05:32 05:50	06:20 06:53	07:25 07:03	07:34	08:16 (1)	07:34	08:16 (1)	08:16 (1)
22	07:29	08:23 (1) 06:54	08:17 06:14	06:20 05:41	05:32 05:50	06:21 06:54	07:26 07:04	07:35	08:17 (1)	07:35	08:17 (1)	08:17 (1)
23	07:28	08:24 (1) 06:53	08:18 06:13	06:19 05:40	05:32 05:47	06:22 06:55	07:27 07:05	07:36	08:18 (1)	07:36	08:18 (1)	08:18 (1)
24	07:28	08:25 (1) 06:51	08:19 06:12	06:18 05:39	05:33 05:48	06:23 06:56	07:28 07:06	07:37	08:19 (1)	07:37	08:19 (1)	08:19 (1)
25	07:27	08:26 (1) 06:50	08:20 06:11	06:17 05:38	05:33 05:53	06:24 06:57	07:29 07:07	07:38	08:20 (1)	07:38	08:20 (1)	08:20 (1)
26	07:26	08:27 (1) 06:48	08:21 06:10	06:16 05:37	05:33 05:54	06:25 06:58	07:30 07:08	07:39	08:21 (1)	07:39	08:21 (1)	08:21 (1)
27	07:25	08:28 (1) 06:46	08:22 06:09	06:15 05:36	05:33 05:55	06:26 06:59	07:31 07:09	07:40	08:22 (1)	07:40	08:22 (1)	08:22 (1)
28	07:24	08:29 (1) 06:45	08:23 06:08	06:14 05:35	05:33 05:56	06:27 07:00	07:32 07:10	07:41	08:23 (1)	07:41	08:23 (1)	08:23 (1)
29	07:23	08:30 (1) 06:43	08:24 06:07	06:13 05:34	05:33 05:57	06:28 07:01	07:33 07:11	07:42	08:24 (1)	07:42	08:24 (1)	08:24 (1)
30	07:22	08:31 (1) 06:41	08:25 06:06	06:12 05:33	05:33 05:58	06:29 07:02	07:34 07:12	07:43	08:25 (1)	07:43	08:25 (1)	08:25 (1)
31	07:22	08:33 (1) 06:39	08:26 06:05	06:11 05:32	05:33 05:59	06:30 07:03	07:35 07:13	07:44	08:26 (1)	07:44	08:26 (1)	08:26 (1)
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285
Total, worst case	1408	68									937	1513
Sun reduction	0.47	0.50									0.37	0.35
Oper. time red.	0.80	0.80									0.80	0.80
Wind dir. red.	0.71	0.71									0.71	0.71
Total reduction	0.26	0.28									0.21	0.19
Total, real	368	19									196	295

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 7

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (13)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:35	07:21	07:58 (1)	06:43	06:51	06:04	05:35	05:35	06:00	06:32	07:03	06:39	07:34 (1)	07:15	07:44 (1)	
	16:46	17:21	08:36 (1)	17:57	19:31	20:04	20:35	20:46	20:27	19:44	18:50	17:02	08:00 (1)	16:37	17 08:01 (1)	
2	07:35	07:20	07:58 (1)	06:42	06:49	06:03	05:34	05:36	06:01	06:33	07:04	06:40	07:33 (1)	07:16	07:47 (1)	
	16:47	17:23	08:36 (1)	17:58	19:32	20:05	20:35	20:46	20:26	19:42	18:48	17:01	08:02 (1)	16:37	14 08:01 (1)	
3	07:35	07:18	07:59 (1)	06:40	06:48	06:02	05:34	05:36	06:02	06:34	07:05	06:41	07:32 (1)	07:17	07:49 (1)	
	16:48	17:24	08:36 (1)	17:59	19:33	20:06	20:36	20:46	20:25	19:40	18:47	17:00	08:03 (1)	16:37	10 07:59 (1)	
4	07:35	07:17	07:59 (1)	06:39	06:46	06:00	05:33	05:37	06:03	06:35	07:07	06:43	07:31 (1)	07:18	07:53 (1)	
	16:49	17:25	08:36 (1)	18:00	19:34	20:07	20:37	20:46	20:24	19:39	18:45	16:58	08:03 (1)	16:36	3 07:56 (1)	
5	07:35	07:16	08:00 (1)	06:37	06:44	06:59	05:33	05:37	06:04	06:36	07:08	06:44	07:31 (1)	07:19		
	16:50	17:27	08:35 (1)	18:00	19:35	20:08	20:38	20:46	20:23	19:37	18:43	16:57	08:05 (1)	16:36		
6	07:35	07:15	08:01 (1)	06:35	06:43	06:58	05:33	05:38	06:05	06:37	07:09	06:45	07:30 (1)	07:20		
	16:51	17:28	08:35 (1)	18:01	19:36	20:09	20:38	20:46	20:22	19:35	18:42	16:56	08:05 (1)	16:36		
7	07:35	07:14	08:01 (1)	06:34	06:41	06:57	05:32	05:39	06:06	06:38	07:10	06:46	07:29 (1)	07:21		
	16:52	17:29	08:33 (1)	18:03	19:38	20:11	20:39	20:45	20:20	19:33	18:40	16:55	08:05 (1)	16:36		
8	07:35	08:09 (1)	07:13	08:02 (1)	07:32	06:39	05:55	05:32	05:39	06:07	06:39	07:11	06:47	07:29 (1)	07:22	
	16:53	2 08:11 (1)	17:30	08:33 (1)	18:04	19:39	20:12	20:40	20:45	20:19	19:32	18:38	16:54	08:07 (1)	16:36	
9	07:35	08:05 (1)	07:12	08:04 (1)	07:30	06:38	05:54	05:32	05:40	06:08	06:40	07:12	06:49	07:29 (1)	07:23	
	16:54	10 08:15 (1)	17:32	08:32 (1)	19:05	19:40	20:13	20:40	20:45	20:18	19:30	18:36	16:53	08:07 (1)	16:36	
10	07:35	08:04 (1)	07:10	08:05 (1)	07:29	06:36	05:53	05:32	05:41	06:09	06:41	07:13	06:50	07:29 (1)	07:23	
	16:55	14 08:18 (1)	17:33	08:31 (1)	19:06	19:41	20:14	20:41	20:44	20:17	19:28	18:35	16:52	08:07 (1)	16:36	
11	07:34	08:02 (1)	07:09	08:06 (1)	07:27	06:34	05:52	05:31	05:41	06:10	06:42	07:14	06:51	07:29 (1)	07:24	
	16:56	17 08:19 (1)	17:34	08:28 (1)	19:07	19:42	20:15	20:42	20:44	20:15	19:27	18:33	16:51	08:08 (1)	16:36	
12	07:34	08:02 (1)	07:08	08:08 (1)	07:25	06:33	05:51	05:31	05:42	06:11	06:43	07:15	06:52	07:29 (1)	07:25	
	16:57	19 08:21 (1)	17:36	08:27 (1)	19:08	19:43	20:16	20:42	20:43	20:14	19:25	18:32	16:50	08:08 (1)	16:36	
13	07:34	08:02 (1)	07:07	08:12 (1)	07:24	06:31	05:50	05:31	05:43	06:12	06:44	07:16	06:54	07:29 (1)	07:26	
	16:58	21 08:23 (1)	17:37	08:24 (1)	19:10	19:44	20:17	20:43	20:43	20:13	19:23	18:30	16:49	08:07 (1)	16:36	
14	07:33	08:00 (1)	07:05	07:22	06:30	05:49	05:31	05:44	06:13	06:45	07:18	06:55	07:30 (1)	07:27		
	16:59	24 08:24 (1)	17:38	08:24 (1)	19:45	20:18	20:43	20:42	20:11	19:21	18:28	16:48	08:08 (1)	16:36		
15	07:33	08:00 (1)	07:04	07:20	06:28	05:48	05:31	05:44	06:14	06:46	07:19	06:56	07:30 (1)	07:27		
	17:00	25 08:25 (1)	17:39	08:25 (1)	19:46	20:19	20:44	20:42	20:10	19:20	18:27	16:47	08:08 (1)	16:37		
16	07:32	07:59 (1)	07:03	07:19	06:26	05:47	05:31	05:45	06:15	06:48	07:20	06:57	07:30 (1)	07:28		
	17:02	27 08:26 (1)	17:41	08:26 (1)	19:47	20:20	20:44	20:41	20:08	19:18	18:25	16:46	08:08 (1)	16:37		
17	07:32	07:59 (1)	07:01	07:17	06:25	05:46	05:31	05:46	06:16	06:49	07:21	06:58	07:30 (1)	07:29		
	17:03	29 08:28 (1)	17:42	08:28 (1)	19:49	20:21	20:44	20:41	20:07	19:16	18:24	16:45	08:07 (1)	16:37		
18	07:31	07:59 (1)	07:00	07:15	06:23	05:45	05:31	05:47	06:17	06:50	07:22	07:00	07:31 (1)	07:29		
	17:04	29 08:28 (1)	17:43	08:28 (1)	19:50	20:22	20:45	20:40	20:05	19:14	18:22	16:44	08:08 (1)	16:37		
19	07:31	07:58 (1)	06:58	07:13	06:22	05:44	05:31	05:48	06:19	06:51	07:23	07:01	07:32 (1)	07:30		
	17:05	31 08:29 (1)	17:44	08:29 (1)	19:51	20:23	20:45	20:39	20:04	19:13	18:21	16:44	08:07 (1)	16:38		
20	07:30	07:58 (1)	06:57	07:12	06:20	05:43	05:32	05:49	06:20	06:52	07:24	07:02	07:32 (1)	07:31		
	17:06	33 08:31 (1)	17:46	08:31 (1)	19:52	20:24	20:45	20:38	20:02	19:11	18:19	16:43	08:07 (1)	16:38		
21	07:30	07:58 (1)	06:56	07:10	06:19	05:42	05:32	05:50	06:21	06:53	07:26	07:03	07:34 (1)	07:31		
	17:08	33 08:31 (1)	17:47	08:31 (1)	19:53	20:25	20:46	20:38	20:01	19:09	18:18	16:42	08:07 (1)	16:39		
22	07:29	07:57 (1)	06:54	07:08	06:17	05:41	05:32	05:50	06:22	06:54	07:27	07:04	07:34 (1)	07:32		
	17:09	35 08:32 (1)	17:48	08:32 (1)	19:54	20:26	20:46	20:37	20:07	19:07	18:16	16:41	08:07 (1)	16:39		
23	07:28	07:58 (1)	06:53	07:07	06:16	05:40	05:32	05:51	06:23	06:55	07:28	07:06	07:35 (1)	07:32		
	17:10	35 08:33 (1)	17:49	08:33 (1)	19:55	20:27	20:46	20:36	20:06	19:06	18:15	16:41	08:06 (1)	16:40		
24	07:28	07:57 (1)	06:51	07:05	06:14	05:40	05:32	05:52	06:24	06:56	07:29	07:07	07:36 (1)	07:33		
	17:11	37 08:34 (1)	17:51	08:34 (1)	19:56	20:28	20:46	20:35	20:05	19:04	18:13	16:40	08:06 (1)	16:40		
25	07:27	07:57 (1)	06:50	07:03	06:13	05:39	05:33	05:53	06:25	06:57	07:30	07:08	07:36 (1)	07:33		
	17:13	37 08:34 (1)	17:52	08:34 (1)	19:57	20:29	20:46	20:34	20:04	19:02	18:12	16:40	08:05 (1)	16:41		
26	07:26	07:57 (1)	06:48	07:01	06:11	05:38	05:33	05:54	06:26	06:58	07:32	07:09	07:38 (1)	07:34		
	17:14	38 08:35 (1)	17:53	08:35 (1)	19:58	20:30	20:46	20:33	20:03	19:03	18:10	16:39	08:05 (1)	16:42		
27	07:25	07:57 (1)	06:46	07:00	06:10	05:38	05:33	05:55	06:27	06:59	07:33	07:10	07:39 (1)	07:34		
	17:15	38 08:35 (1)	17:54	08:35 (1)	20:00	20:31	20:47	20:33	20:03	18:57	18:09	16:39	08:05 (1)	16:42		
28	07:24	07:57 (1)	06:45	06:58	06:08	05:37	05:34	05:56	06:28	07:00	07:34	07:11	07:40 (1)	07:34		
	17:16	38 08:35 (1)	17:55	08:35 (1)	20:01	20:31	20:47	20:32	20:02	18:55	18:07	16:38	08:04 (1)	16:43		
29	07:23	07:57 (1)	06:44	06:56	06:07	05:36	05:34	05:57	06:29	07:01	07:35	07:12	07:42 (1)	07:34		
	17:18	38 08:35 (1)	17:56	08:35 (1)	20:02	20:32	20:47	20:31	20:01	18:53	18:06	16:38	08:05 (1)	16:44		
30	07:22	07:57 (1)	06:43	06:55	06:06	05:36	05:35	05:58	06:30	07:02	07:36	07:14	07:43 (1)	07:35		
	17:19	39 08:36 (1)	17:57	08:36 (1)	20:03	20:33	20:47	20:30	20:00	18:52	18:05	16:37	08:02 (1)	16:44		
31	07:22	07:57 (1)	06:42	06:53	06:05	05:35	05:35	05:59	06:31	07:03	07:38	07:15	07:44 (1)	07:35		
	17:20	39 08:36 (1)	17:58	08:36 (1)	20:04	20:34	20:48	20:28	20:01	18:54	18:03	16:37	08:02 (1)	16:45		
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285				
Total, worst case	688	389									57	984		44		
Sun reduction	0.47	0.50									0.49	0.37		0.35		
Oper. time red.	0.80	0.80									0.80	0.80		0.80		
Wind dir. red.	0.70	0.70									0.70	0.70		0.70		
Total reduction	0.26	0.28									0.27	0.21		0.19		
Total, real	178	107									16	203		8		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 8

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (14)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.43	5.24	5.95	7.01	8.58	9.67	9.71	8.48	7.21	5.48	3.66	3.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	328	224	196	144	406	862	868	531	517	1,188	1,272	6,970

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December			
1	07:35	07:21	06:43	07:23 (1)	06:51	06:04	05:35	05:35	06:00	06:32	07:03	08:05 (1)	06:39	07:15	
	16:46	17:21	17:57	08:05 (1)	19:31	20:04	20:35	20:46	20:27	19:44	18:50	08:35 (1)	17:02	16:37	
2	07:35	07:20	06:42	07:22 (1)	06:49	06:03	05:34	05:36	06:01	06:33	07:04	08:03 (1)	06:40	07:16	
	16:47	17:23	17:58	08:04 (1)	19:32	20:05	20:35	20:46	20:26	19:42	18:48	08:36 (1)	17:01	16:37	
3	07:35	07:18	06:40	07:23 (1)	06:48	06:02	05:34	05:36	06:02	06:34	07:05	08:02 (1)	06:41	07:17	
	16:48	17:24	17:59	08:05 (1)	19:33	20:06	20:36	20:46	20:25	19:40	18:47	08:37 (1)	17:00	16:37	
4	07:35	07:17	06:39	07:22 (1)	06:46	06:00	05:33	05:37	06:03	06:35	07:07	08:01 (1)	06:43	07:18	
	16:49	17:25	18:00	08:04 (1)	19:34	20:07	20:37	20:46	20:24	19:39	18:45	08:38 (1)	16:58	16:36	
5	07:35	07:16	06:37	07:23 (1)	06:44	05:59	05:33	05:37	06:04	06:36	07:08	08:00 (1)	06:44	07:19	
	16:50	17:27	18:00	08:04 (1)	19:35	20:08	20:38	20:46	20:23	19:37	18:43	08:39 (1)	16:57	16:36	
6	07:35	07:15	06:35	07:22 (1)	06:43	05:58	05:33	05:38	06:05	06:37	07:09	07:59 (1)	06:45	07:20	
	16:51	17:28	18:01	08:04 (1)	19:36	20:09	20:38	20:46	20:22	19:35	18:42	08:39 (1)	16:56	16:36	
7	07:35	07:14	06:34	07:22 (1)	06:41	05:57	05:32	05:39	06:06	06:38	07:10	07:58 (1)	06:46	07:21	
	16:52	17:29	18:03	08:03 (1)	19:38	20:11	20:39	20:45	20:20	19:33	18:40	08:39 (1)	16:55	16:36	
8	07:35	07:13	06:32	08:23 (1)	06:39	05:55	05:32	05:39	06:07	06:39	07:11	07:58 (1)	06:47	07:22	
	16:53	17:30	18:04	09:02 (1)	19:39	20:12	20:40	20:45	20:19	19:32	18:38	08:39 (1)	16:54	16:36	
9	07:35	07:12	06:30	08:23 (1)	06:38	05:54	05:32	05:40	06:08	06:40	07:12	07:59 (1)	06:49	07:23	
	16:54	17:32	18:05	09:01 (1)	19:40	20:13	20:40	20:45	20:18	19:30	18:36	08:39 (1)	16:53	16:36	
10	07:35	07:10	06:29	08:24 (1)	06:36	05:53	05:30	05:41	06:09	06:41	07:13	07:57 (1)	06:50	07:23	
	16:55	17:33	18:06	09:00 (1)	19:41	20:14	20:41	20:44	20:17	19:28	18:35	08:39 (1)	16:52	16:36	
11	07:34	07:09	06:27	08:24 (1)	06:34	05:52	05:32	05:41	06:10	06:42	07:14	07:56 (1)	06:51	07:24	
	16:56	17:34	18:07	09:01 (1)	19:42	20:15	20:42	20:44	20:15	19:27	18:33	08:38 (1)	16:51	16:36	
12	07:34	07:08	06:25	08:26 (1)	06:33	05:51	05:31	05:42	06:11	06:43	07:15	07:57 (1)	06:52	07:25	
	16:57	17:36	18:08	09:02 (1)	19:43	20:16	20:42	20:43	20:14	19:25	18:32	08:38 (1)	16:50	16:36	
13	07:34	07:07	06:24	08:27 (1)	06:31	05:50	05:31	05:43	06:12	06:44	07:16	07:59 (1)	06:54	07:26	
	16:58	17:37	18:09	09:03 (1)	19:44	20:17	20:43	20:43	20:13	19:23	18:30	08:38 (1)	16:49	16:36	
14	07:33	07:05	06:22	08:28 (1)	06:30	05:49	05:31	05:44	06:13	06:45	07:18	07:57 (1)	06:55	07:27	
	16:59	17:38	18:10	09:04 (1)	19:45	20:18	20:43	20:42	20:11	19:21	18:28	08:37 (1)	16:48	16:36	
15	07:33	07:04	06:20	08:31 (1)	06:28	05:48	05:31	05:44	06:14	06:46	07:19	07:57 (1)	06:56	07:27	
	17:00	17:39	18:11	09:05 (1)	19:46	20:19	20:43	20:42	20:10	19:20	18:27	08:37 (1)	16:47	16:37	
16	07:32	07:03	06:19	08:34 (1)	06:26	05:47	05:31	05:45	06:15	06:48	07:20	07:57 (1)	06:57	07:28	
	17:02	17:41	18:13	09:06 (1)	19:47	20:20	20:44	20:41	20:08	19:18	18:25	08:36 (1)	16:46	16:37	
17	07:32	07:01	06:17	08:46 (1)	06:25	05:46	05:31	05:46	06:16	06:49	07:21	07:58 (1)	06:58	07:29	
	17:03	17:42	18:14	09:07 (1)	19:48	20:21	20:44	20:41	20:07	19:16	18:24	08:35 (1)	16:45	16:37	
18	07:31	07:00	06:15	08:47 (1)	06:24	05:45	05:31	05:47	06:17	06:50	07:22	07:59 (1)	07:00	07:29	
	17:04	17:43	18:15	09:08 (1)	19:49	20:22	20:45	20:40	20:05	19:14	18:22	08:34 (1)	16:44	16:37	
19	07:31	06:58	06:12	08:48 (1)	06:23	05:44	05:31	05:48	06:19	06:51	07:23	08:00 (1)	07:01	07:30	
	17:05	17:44	18:16	09:09 (1)	19:50	20:23	20:45	20:39	20:04	19:13	18:21	08:33 (1)	16:44	16:38	
20	07:30	06:57	06:11	08:49 (1)	06:22	05:43	05:32	05:49	06:20	06:52	07:24	08:00 (1)	07:02	07:31	
	17:06	17:46	18:18	09:10 (1)	19:51	20:24	20:45	20:38	20:02	19:11	18:19	08:31 (1)	16:43	16:38	
21	07:30	06:56	06:10	08:50 (1)	06:21	05:42	05:32	05:50	06:21	06:53	07:25	08:02 (1)	07:03	07:31	
	17:07	17:47	18:19	09:11 (1)	19:52	20:25	20:46	20:38	20:01	19:09	18:18	08:29 (1)	16:42	16:39	
22	07:29	06:54	06:08	08:51 (1)	06:20	05:41	05:32	05:50	06:22	06:54	07:27	08:04 (1)	07:04	07:32	
	17:09	17:48	18:20	09:12 (1)	19:53	20:26	20:46	20:37	20:00	19:07	18:16	08:28 (1)	16:41	16:39	
23	07:28	06:53	06:07	08:52 (1)	06:19	05:40	05:32	05:51	06:23	06:55	07:28	08:06 (1)	07:06	07:32	
	17:10	17:49	18:21	09:13 (1)	19:54	20:27	20:46	20:36	20:00	19:06	18:15	08:25 (1)	16:41	16:40	
24	07:28	06:51	06:05	08:53 (1)	06:18	05:39	05:32	05:52	06:24	06:56	07:29	08:09 (1)	07:07	07:33	
	17:11	17:51	18:23	09:14 (1)	19:55	20:28	20:46	20:35	20:00	19:04	18:13	08:22 (1)	16:40	16:40	
25	07:27	06:50	06:04	08:54 (1)	06:17	05:38	05:33	05:53	06:25	06:57	07:30	08:10 (1)	07:08	07:33	
	17:13	17:52	18:24	09:15 (1)	19:56	20:29	20:46	20:34	20:00	19:02	18:12	08:21 (1)	16:40	16:41	
26	07:26	06:48	06:02	08:55 (1)	06:16	05:37	05:33	05:54	06:26	06:58	07:32	08:11 (1)	07:09	07:33	
	17:14	17:53	18:25	09:16 (1)	19:57	20:30	20:46	20:33	20:00	19:00	18:10	08:20 (1)	16:39	16:42	
27	07:25	06:46	06:00	08:56 (1)	06:15	05:36	05:33	05:55	06:27	06:59	07:34	08:12 (1)	07:10	07:34	
	17:15	17:54	18:26	09:17 (1)	19:58	20:31	20:47	20:33	20:00	18:57	8	08:25 (1)	18:09	16:39	16:42
28	07:24	06:45	06:04	08:57 (1)	06:14	05:35	05:34	05:56	06:28	07:00	07:35	08:13 (1)	07:11	07:34	
	17:16	17:55	18:27	09:18 (1)	19:59	20:32	20:47	20:32	20:00	18:55	18	08:30 (1)	18:07	16:38	16:43
29	07:23	06:44	06:03	08:58 (1)	06:13	05:34	05:34	05:57	06:29	07:01	07:36	08:14 (1)	07:12	07:34	
	17:18	17:57	18:29	09:19 (1)	20:00	20:33	20:47	20:31	20:00	18:53	23	08:32 (1)	18:06	16:38	16:44
30	07:22	06:43	06:02	08:59 (1)	06:12	05:33	05:35	05:58	06:30	07:02	07:37	08:15 (1)	07:13	07:35	
	17:19	17:58	18:30	09:20 (1)	20:01	20:34	20:47	20:30	20:00	18:52	27	08:34 (1)	18:05	16:37	16:44
31	07:22	06:42	06:01	09:00 (1)	06:11	05:32	05:35	05:59	06:31	07:03	07:38	08:16 (1)	07:14	07:35	
	17:20	17:59	18:31	09:21 (1)	20:02	20:35	20:48	20:28	20:00	19:45	18:03	08:17 (1)	18:03	16:45	16:45
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285			
Total, worst case		347	553						76	843					
Sun reduction		0.50	0.50						0.58	0.49					
Oper. time red.		0.80	0.80						0.80	0.80					
Wind dir. red.		0.65	0.65						0.65	0.65					
Total reduction		0.26	0.26						0.30	0.26					
Total, real		89	144						23	216					

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 9

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: G - Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (15)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December							
1	07:35	07:21	06:43	06:51	06:04	06:27 (1)	05:35	06:18 (1)	05:35	06:26 (1)	06:00	06:26 (1)	06:32	07:03	06:39	07:15			
	16:46	17:21	17:57	19:31	20:04	22	20:35	41	06:59 (1)	20:46	36	07:02 (1)	20:27	43	07:09 (1)	19:43	18:50	17:02	16:37
2	07:35	07:20	06:42	06:49	06:03	06:25 (1)	05:34	06:18 (1)	05:36	06:27 (1)	06:01	06:26 (1)	06:33	07:04	06:40	07:16			
	16:47	17:23	17:58	19:32	20:05	26	20:35	41	06:59 (1)	20:46	36	07:03 (1)	20:26	43	07:09 (1)	19:42	18:48	17:01	16:37
3	07:35	07:18	06:40	06:48	06:02	06:24 (1)	05:34	06:18 (1)	05:36	06:26 (1)	06:02	06:27 (1)	06:34	07:05	06:41	07:17			
	16:48	17:24	17:59	19:33	20:06	29	20:36	41	06:59 (1)	20:46	37	07:03 (1)	20:25	41	07:08 (1)	19:40	18:47	17:00	16:37
4	07:35	07:17	06:39	06:46	06:00	06:21 (1)	05:33	06:19 (1)	05:37	06:26 (1)	06:03	06:27 (1)	06:35	07:07	06:43	07:18			
	16:49	17:25	18:00	19:34	20:07	32	20:37	40	06:59 (1)	20:46	38	07:04 (1)	20:24	40	07:07 (1)	19:38	18:45	16:58	16:36
5	07:35	07:16	06:37	06:44	05:59	06:20 (1)	05:33	06:19 (1)	05:37	06:26 (1)	06:04	06:28 (1)	06:36	07:08	06:44	07:19			
	16:50	17:27	18:00	19:35	20:08	35	20:38	39	06:58 (1)	20:46	38	07:04 (1)	20:23	39	07:07 (1)	19:37	18:43	16:57	16:36
6	07:35	07:15	06:35	06:43	05:58	06:20 (1)	05:33	06:20 (1)	05:38	06:26 (1)	06:05	06:29 (1)	06:37	07:09	06:45	07:20			
	16:51	17:28	18:01	19:36	20:09	36	20:38	38	06:58 (1)	20:46	38	07:04 (1)	20:22	37	07:07 (1)	19:35	18:42	16:56	16:36
7	07:35	07:14	06:34	06:41	05:57	06:19 (1)	05:32	06:20 (1)	05:39	06:26 (1)	06:06	06:29 (1)	06:38	07:10	06:46	07:21			
	16:52	17:29	18:03	19:38	20:11	38	20:39	38	06:58 (1)	20:45	39	07:05 (1)	20:20	36	07:05 (1)	19:33	18:40	16:55	16:36
8	07:35	07:13	07:32	06:39	05:55	06:18 (1)	05:32	06:20 (1)	05:39	06:26 (1)	06:07	06:30 (1)	06:39	07:11	06:47	07:22			
	16:53	17:30	18:04	19:39	20:12	39	20:40	38	06:58 (1)	20:45	39	07:05 (1)	20:19	34	07:04 (1)	19:32	18:38	16:54	16:36
9	07:35	07:12	07:30	06:38	05:54	06:17 (1)	05:32	06:21 (1)	05:40	06:26 (1)	06:08	06:31 (1)	06:40	07:12	06:49	07:23			
	16:54	17:32	19:05	19:40	20:13	41	20:40	37	06:58 (1)	20:45	40	07:06 (1)	20:18	31	07:02 (1)	19:30	18:37	16:53	16:36
10	07:35	07:10	07:29	06:36	05:53	06:17 (1)	05:32	06:21 (1)	05:41	06:25 (1)	06:09	06:33 (1)	06:41	07:13	06:50	07:23			
	16:55	17:33	19:06	19:41	20:14	42	20:41	37	06:59 (1)	20:44	41	07:06 (1)	20:17	28	07:01 (1)	19:28	18:35	16:52	16:36
11	07:34	07:09	07:27	06:34	05:52	06:15 (1)	05:32	06:22 (1)	05:41	06:25 (1)	06:10	06:34 (1)	06:42	07:14	06:51	07:24			
	16:56	17:34	19:07	19:42	20:15	43	20:41	36	06:58 (1)	20:44	41	07:06 (1)	20:15	25	06:59 (1)	19:27	18:33	16:51	16:36
12	07:34	07:08	07:25	06:33	05:51	06:15 (1)	05:31	06:22 (1)	05:42	06:25 (1)	06:11	06:36 (1)	06:43	07:15	06:52	07:25			
	16:57	17:36	19:08	19:43	20:16	44	20:42	36	06:58 (1)	20:43	42	07:07 (1)	20:14	21	06:57 (1)	19:25	18:32	16:50	16:36
13	07:34	07:07	07:24	06:31	05:50	06:15 (1)	05:31	06:23 (1)	05:43	06:26 (1)	06:12	06:39 (1)	06:44	07:16	06:54	07:26			
	16:58	17:37	19:10	19:44	20:17	44	20:43	35	06:58 (1)	20:43	42	07:08 (1)	20:13	15	06:54 (1)	19:23	18:30	16:49	16:36
14	07:33	07:05	07:22	06:30	05:49	06:14 (1)	05:31	06:23 (1)	05:44	06:25 (1)	06:13	06:46 (1)	06:45	07:18	06:55	07:27			
	16:59	17:38	19:11	19:45	20:18	45	20:43	35	06:59 (1)	20:42	42	07:07 (1)	20:11	2	06:47 (1)	19:21	18:28	16:48	16:36
15	07:33	07:04	07:20	06:28	05:48	06:14 (1)	05:31	06:24 (1)	05:44	06:25 (1)	06:14		06:46	07:19	06:56	07:27			
	17:00	17:39	19:12	19:46	20:19	45	20:43	34	06:58 (1)	20:42	43	07:08 (1)	20:10		19:20	18:27	16:47	16:37	
16	07:32	07:03	07:19	06:26	05:47	06:15 (1)	05:31	06:24 (1)	05:45	06:25 (1)	06:15		06:48	07:20	06:57	07:28			
	17:02	17:41	19:13	19:47	20:20	45	20:44	34	06:58 (1)	20:41	44	07:09 (1)	20:08		19:18	18:25	16:46	16:37	
17	07:32	07:01	07:17	06:25	05:46	06:15 (1)	05:31	06:24 (1)	05:46	06:25 (1)	06:16		06:49	07:21	06:58	07:29			
	17:03	17:42	19:14	19:49	20:21	45	20:44	34	06:58 (1)	20:41	44	07:09 (1)	20:07		19:16	18:24	16:45	16:37	
18	07:31	07:00	07:15	06:23	05:45	06:15 (1)	05:31	06:24 (1)	05:47	06:25 (1)	06:17		06:50	07:22	07:00	07:29			
	17:04	17:43	19:15	19:50	20:22	45	20:45	34	06:58 (1)	20:40	45	07:10 (1)	20:05		19:14	18:22	16:44	16:38	
19	07:31	06:58	07:13	06:22	05:44	06:14 (1)	05:31	06:25 (1)	05:48	06:24 (1)	06:19		06:51	07:23	07:01	07:30			
	17:05	17:44	19:16	19:51	20:23	46	20:45	33	06:58 (1)	20:39	45	07:09 (1)	20:04		19:13	18:21	16:44	16:38	
20	07:30	06:57	07:12	06:20	05:43	06:14 (1)	05:32	06:25 (1)	05:49	06:24 (1)	06:20		06:52	07:24	07:02	07:31			
	17:06	17:46	19:18	19:52	20:24	46	20:45	33	06:58 (1)	20:38	46	07:10 (1)	20:02		19:11	18:19	16:43	16:38	
21	07:30	06:55	07:10	06:19	05:42	06:14 (1)	05:32	06:26 (1)	05:50	06:24 (1)	06:21		06:53	07:26	07:03	07:31			
	17:08	17:47	19:19	19:53	20:25	46	20:46	33	06:59 (1)	20:38	46	07:10 (1)	20:01		19:09	18:18	16:42	16:39	
22	07:29	06:54	07:08	06:17	05:41	06:15 (1)	05:32	06:26 (1)	05:50	06:25 (1)	06:22		06:54	07:27	07:04	07:32			
	17:09	17:48	19:20	19:54	20:26	46	20:46	33	06:59 (1)	20:37	45	07:10 (1)	19:59		19:07	18:16	16:41	16:39	
23	07:28	06:53	07:07	06:16	05:40	06:15 (1)	05:32	06:26 (1)	05:51	06:25 (1)	06:23		06:55	07:28	07:06	07:32			
	17:10	17:49	19:21	19:55	20:27	45	20:46	33	06:59 (1)	20:36	45	07:10 (1)	19:58		19:06	18:15	16:41	16:40	
24	07:28	06:51	07:05	06:14	05:40	06:15 (1)	05:32	06:26 (1)	05:52	06:25 (1)	06:24		06:56	07:29	07:07	07:33			
	17:11	17:51	19:22	19:56	20:28	45	20:46	33	06:59 (1)	20:35	46	07:11 (1)	19:56		19:04	18:13	16:40	16:40	
25	07:27	06:50	07:03	06:13	05:39	06:15 (1)	05:33	06:26 (1)	05:53	06:25 (1)	06:25		06:57	07:30	07:08	07:33			
	17:13	17:52	19:23	19:57	20:29	44	20:46	34	06:59 (1)	20:34	46	07:11 (1)	19:55		19:02	18:12	16:40	16:41	
26	07:26	06:48	07:01	06:11	05:38	06:16 (1)	05:33	06:26 (1)	05:54	06:25 (1)	06:26		06:58	07:32	07:09	07:33			
	17:14	17:53	19:24	19:58	20:30	44	20:46	34	07:00 (1)	20:33	46	07:11 (1)	19:53		19:00	18:10	16:39	16:42	
27	07:25	06:46	07:00	06:10	05:38	06:15 (1)	05:33	06:26 (1)	05:55	06:25 (1)	06:27		06:59	07:33	07:10	07:34			
	17:15	17:54	19:25	20:00	20:30	44	20:46	34	06:59 (1)	20:33	46	07:11 (1)	19:52		18:57	18:09	16:39	16:42	
28	07:24	06:45	06:58	06:08	05:37	06:16 (1)	05:34	06:26 (1)	05:56	06:25 (1)	06:28		07:00	07:34	07:11	07:34			
	17:16	17:55	19:26	20:01	20:31	44	20:47	35	07:01 (1)	20:32	45	07:10 (1)	19:50		18:55	18:07	16:38	16:43	
29	07:23	06:56	06:07	06:35 (1)	05:36	06:16 (1)	05:34	06:26 (1)	05:57	06:25 (1)	06:29		07:01	07:35	07:12	07:34			
	17:18	19:28	20:02	7	06:42 (1)	20:32	43	06:59 (1)	20:47	35	07:01 (1)	20:31	45	07:10 (1)	19:48	18:53	18:06	16:38	16:44
30	07:22	06:55	06:06	06:30 (1)	05:36	06:17 (1)	05:35	06:27 (1)	05:58	06:25 (1)	06:30		07:02	07:36	07:14	07:35			
	17:19	19:29	20:03	17	06:47 (1)	20:33	43	07:00 (1)	20:46	35	07:02 (1)	20:30	45	07:10 (1)	19:47	18:52	18:05	16:37	16:44
31	07:22	06:53	06:05	05:35	05:35	06:17 (1)	05:35	05:59		06:25 (1)	06:31		07:03	07:38	07:35	07:35			
	17:20	19:30	20:04	42															

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 10

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: H - Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (16)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December			
1	07:35	12:26 (1)	07:21	06:43	06:51	06:04	05:35	05:35	06:00	06:32	07:03	06:39	07:15	12:23 (1)	
16:46	49	13:15 (1)	17:21	17:57	19:31	20:04	20:35	20:46	20:27	19:43	18:50	17:02	16:37	29	12:52 (1)
2	07:35	12:27 (1)	07:19	06:42	06:49	06:03	05:34	05:36	06:01	06:33	07:04	06:40	07:16	12:21 (1)	
16:47	48	13:15 (1)	17:23	17:58	19:32	20:05	20:35	20:46	20:26	19:42	18:48	17:01	16:37	33	12:54 (1)
3	07:35	12:28 (1)	07:18	06:40	06:48	06:02	05:34	05:36	06:02	06:34	07:05	06:41	07:17	12:21 (1)	
16:48	47	13:15 (1)	17:24	17:59	19:33	20:06	20:36	20:46	20:25	19:40	18:47	17:00	16:37	36	12:57 (1)
4	07:35	12:29 (1)	07:17	06:39	06:46	06:00	05:33	05:37	06:03	06:35	07:06	06:42	07:18	12:20 (1)	
16:49	46	13:15 (1)	17:25	18:00	19:34	20:07	20:37	20:46	20:24	19:38	18:45	16:58	16:36	38	12:58 (1)
5	07:35	12:31 (1)	07:16	06:37	06:44	05:59	05:33	05:37	06:04	06:36	07:08	06:44	07:19	12:19 (1)	
16:50	44	13:15 (1)	17:27	18:00	19:35	20:08	20:38	20:46	20:23	19:37	18:43	16:57	16:36	40	12:59 (1)
6	07:35	12:32 (1)	07:15	06:35	06:43	05:58	05:33	05:38	06:05	06:37	07:09	06:45	07:20	12:18 (1)	
16:51	43	13:15 (1)	17:28	18:01	19:36	20:09	20:38	20:46	20:22	19:35	18:41	16:56	16:36	43	13:01 (1)
7	07:35	12:33 (1)	07:14	06:34	06:41	05:57	05:32	05:39	06:06	06:38	07:10	06:46	07:21	12:18 (1)	
16:52	40	13:13 (1)	17:29	18:03	19:37	20:10	20:39	20:45	20:20	19:33	18:40	16:55	16:36	44	13:02 (1)
8	07:35	12:35 (1)	07:13	07:32	06:39	05:55	05:32	05:39	06:07	06:39	07:11	06:47	07:22	12:18 (1)	
16:53	38	13:13 (1)	17:30	18:04	19:39	20:12	20:40	20:45	20:19	19:32	18:38	16:54	16:36	45	13:03 (1)
9	07:35	12:37 (1)	07:12	07:30	06:38	05:54	05:32	05:40	06:08	06:40	07:12	06:49	07:23	12:16 (1)	
16:54	36	13:13 (1)	17:32	19:05	19:40	20:13	20:40	20:45	20:18	19:30	18:36	16:53	16:36	47	13:03 (1)
10	07:35	12:39 (1)	07:10	07:29	06:36	05:53	05:32	05:41	06:09	06:41	07:13	06:50	07:23	12:16 (1)	
16:55	33	13:12 (1)	17:33	19:06	19:41	20:14	20:41	20:44	20:17	19:28	18:35	16:52	16:36	48	13:04 (1)
11	07:34	12:40 (1)	07:09	07:27	06:34	05:52	05:31	05:41	06:10	06:42	07:14	06:51	07:24	12:16 (1)	
16:56	30	13:10 (1)	17:34	19:07	19:42	20:15	20:41	20:44	20:15	19:27	18:33	16:51	16:36	49	13:05 (1)
12	07:34	12:44 (1)	07:08	07:25	06:33	05:51	05:31	05:42	06:11	06:43	07:15	06:52	07:25	12:16 (1)	
16:57	25	13:09 (1)	17:36	19:08	19:43	20:16	20:42	20:43	20:14	19:25	18:32	16:50	16:36	50	13:06 (1)
13	07:34	12:47 (1)	07:07	07:24	06:31	05:50	05:31	05:43	06:12	06:44	07:16	06:54	07:26	12:17 (1)	
16:58	20	13:07 (1)	17:37	19:10	19:44	20:17	20:43	20:43	20:13	19:23	18:30	16:49	16:36	50	13:07 (1)
14	07:33	12:52 (1)	07:05	07:22	06:30	05:49	05:31	05:44	06:13	06:45	07:18	06:55	07:27	12:17 (1)	
16:59	10	13:02 (1)	17:38	19:11	19:45	20:18	20:43	20:42	20:11	19:21	18:28	16:48	16:36	51	13:08 (1)
15	07:33	07:04	07:20	06:28	05:48	05:31	05:44	05:44	06:14	06:46	07:19	06:56	07:27	12:16 (1)	
17:00	17:39	19:12	19:46	20:19	20:43	20:42	20:10	19:20	18:27	16:47	16:37	52	13:08 (1)		
16	07:32	07:03	07:19	06:26	05:47	05:31	05:45	06:15	06:47	07:20	06:57	07:28	12:17 (1)		
17:02	17:41	19:13	19:47	20:20	20:44	20:41	20:08	19:18	18:25	16:46	16:37	52	13:09 (1)		
17	07:32	07:01	07:17	06:25	05:46	05:31	05:46	06:16	06:49	07:21	06:58	07:29	12:18 (1)		
17:03	17:42	19:14	19:49	20:21	20:44	20:41	20:07	19:16	18:24	16:45	16:37	52	13:10 (1)		
18	07:31	07:00	07:15	06:23	05:45	05:31	05:47	06:17	06:50	07:22	07:00	07:29	12:17 (1)		
17:04	17:43	19:15	19:50	20:22	20:45	20:40	20:05	19:14	18:22	16:44	16:37	53	13:10 (1)		
19	07:31	06:58	07:13	06:22	05:44	05:31	05:48	06:18	06:51	07:23	07:01	07:30	12:18 (1)		
17:05	17:44	19:16	19:51	20:23	20:45	20:39	20:04	19:13	18:20	16:44	16:38	53	13:11 (1)		
20	07:30	06:57	07:12	06:20	05:43	05:32	05:49	06:20	06:52	07:24	07:02	07:31	12:18 (1)		
17:06	17:46	19:17	19:52	20:24	20:45	20:38	20:02	19:11	18:19	16:43	16:38	53	13:11 (1)		
21	07:30	06:55	07:10	06:19	05:42	05:32	05:50	06:21	06:53	07:26	07:03	07:31	12:19 (1)		
17:08	17:47	19:19	19:53	20:25	20:46	20:38	20:01	19:09	18:17	16:42	16:39	53	13:12 (1)		
22	07:29	06:54	07:08	06:17	05:41	05:32	05:50	06:22	06:54	07:27	07:04	07:32	12:19 (1)		
17:09	17:48	19:20	19:54	20:26	20:46	20:37	19:59	19:07	18:16	16:41	16:39	53	13:12 (1)		
23	07:28	06:53	07:07	06:16	05:40	05:32	05:51	06:23	06:55	07:28	07:06	07:32	12:20 (1)		
17:10	17:49	19:21	19:55	20:27	20:46	20:36	19:58	19:06	18:15	16:41	16:40	53	13:13 (1)		
24	07:28	06:51	07:05	06:14	05:40	05:32	05:52	06:24	06:56	07:29	07:07	07:33	12:20 (1)		
17:11	17:51	19:22	19:56	20:28	20:46	20:35	19:56	19:04	18:13	16:40	16:40	53	13:13 (1)		
25	07:27	06:49	07:03	06:13	05:39	05:33	05:53	06:25	06:57	07:30	07:08	07:33	12:21 (1)		
17:12	17:52	19:23	19:57	20:29	20:46	20:34	19:55	19:02	18:12	16:40	16:41	53	13:14 (1)		
26	07:26	06:48	07:01	06:11	05:38	05:33	05:54	06:26	06:58	07:32	07:09	07:33	12:21 (1)		
17:14	17:53	19:24	19:58	20:30	20:46	20:33	19:53	19:00	18:10	16:39	16:42	53	13:14 (1)		
27	07:25	06:46	07:00	06:10	05:37	05:33	05:55	06:27	06:59	07:33	07:10	07:34	12:22 (1)		
17:15	17:54	19:25	20:00	20:30	20:46	20:33	19:52	18:57	18:09	16:39	16:42	52	13:14 (1)		
28	07:24	06:45	06:58	06:08	05:37	05:34	05:56	06:28	07:00	07:34	07:11	12:33 (1)	07:34	12:22 (1)	
17:16	17:55	19:26	20:01	20:31	20:47	20:32	19:50	18:55	18:07	16:38	9	12:42 (1)	16:43	52	13:14 (1)
29	07:23	06:45	06:56	06:07	05:36	05:34	05:57	06:29	07:01	07:35	07:12	12:28 (1)	07:34	12:24 (1)	
17:18	19:28	20:02	20:32	20:47	20:31	19:48	18:53	18:06	16:38	19	12:47 (1)	16:44	51	13:15 (1)	
30	07:22	06:45	06:06	05:36	05:35	05:58	06:30	07:02	07:36	07:14	12:25 (1)	07:35	12:24 (1)		
17:19	19:29	20:03	20:33	20:46	20:30	19:47	18:52	18:05	16:37	25	12:50 (1)	16:44	51	13:15 (1)	
31	07:21	06:43	06:05	05:35	05:35	05:59	06:31	07:03	07:38	07:16	12:25 (1)	07:35	12:25 (1)		
17:20	19:30	20:04	20:34	20:47	20:28	19:45	18:50	18:03	16:45	50	13:15 (1)				
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285			
Total, worst case	509										53	1492			
Sun reduction	0.47										0.37	0.35			
Oper. time red.	0.80										0.80	0.80			
Wind dir. red.	0.63										0.63	0.63			
Total reduction	0.23										0.19	0.17			
Total, real	119										10	261			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 11

Licensed user:

Howard R. Green Company
 8710 Earhar Lane SW
 US-CEDAR RAPIDS, IA 52409
 319 841 4000
 Ted McCaslin / tmccaslin@hrgreen.com
 Calculated:
 12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: I - Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (17)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:35 16:46	13:59 (1) 15:00 (1)	07:21 17:21	06:43 17:57	06:51 19:31	06:04 20:04	05:35 20:46	06:00 20:27	06:32 19:43	07:03 18:50	06:39 17:02	07:15 16:37	13:48 (1) 14:43 (1)	
2	07:35 16:47	14:00 (1) 15:00 (1)	07:19 17:23	06:42 17:58	06:49 19:32	06:03 20:05	05:36 20:46	06:01 20:26	06:33 19:42	07:04 18:48	06:40 17:01	07:16 16:37	13:47 (1) 14:44 (1)	
3	07:35 16:48	14:00 (1) 15:00 (1)	07:18 17:24	06:40 17:59	06:48 19:33	06:02 20:06	05:36 20:46	06:02 20:25	06:34 19:40	07:05 18:47	06:41 17:00	07:17 16:37	13:48 (1) 14:46 (1)	
4	07:35 16:49	14:01 (1) 15:01 (1)	07:17 17:25	06:38 18:00	06:46 19:34	06:00 20:07	05:37 20:46	06:03 20:24	06:35 19:38	07:06 18:45	06:42 16:58	07:18 16:36	13:48 (1) 14:46 (1)	
5	07:35 16:50	14:02 (1) 15:01 (1)	07:16 17:27	06:37 18:00	06:44 19:35	05:59 20:08	05:37 20:46	06:04 20:23	06:36 19:37	07:08 18:43	06:44 16:57	07:19 16:36	13:48 (1) 14:47 (1)	
6	07:35 16:51	14:02 (1) 15:01 (1)	07:15 17:28	06:35 18:01	06:43 19:36	05:58 20:09	05:38 20:46	06:05 20:22	06:37 19:35	07:09 18:41	06:45 16:56	07:20 16:36	13:48 (1) 14:48 (1)	
7	07:35 16:52	14:02 (1) 15:01 (1)	07:14 17:29	06:34 18:03	06:41 19:37	05:57 20:10	05:39 20:45	06:06 20:20	06:38 19:33	07:10 18:40	06:46 16:55	07:21 16:36	13:49 (1) 14:49 (1)	
8	07:35 16:53	14:03 (1) 15:01 (1)	07:13 17:30	06:32 18:04	06:39 19:39	05:55 20:12	05:39 20:45	06:07 20:19	06:39 19:32	07:11 18:38	06:47 16:54	07:22 16:36	13:49 (1) 14:49 (1)	
9	07:35 16:54	14:03 (1) 15:02 (1)	07:12 17:31	06:30 18:04	06:38 19:39	05:54 20:13	05:40 20:45	06:08 20:18	06:40 19:30	07:12 18:36	06:49 16:53	07:23 16:36	13:48 (1) 14:48 (1)	
10	07:35 16:55	14:03 (1) 15:02 (1)	07:11 17:32	06:29 18:05	06:36 19:40	05:53 20:13	05:41 20:45	06:09 20:17	06:41 19:28	07:13 18:35	06:50 16:53	07:23 16:36	13:49 (1) 14:49 (1)	
11	07:35 16:56	14:04 (1) 15:02 (1)	07:10 17:33	06:28 18:06	06:34 19:41	05:52 20:14	05:41 20:44	06:10 20:17	06:42 19:28	07:14 18:35	06:51 16:52	07:24 16:36	13:49 (1) 14:50 (1)	
12	07:35 16:57	14:04 (1) 15:01 (1)	07:09 17:34	06:27 18:07	06:34 19:42	05:52 20:15	05:41 20:44	06:10 20:15	06:42 19:27	07:14 18:33	06:51 16:51	07:24 16:36	13:49 (1) 14:51 (1)	
13	07:35 16:58	14:04 (1) 15:01 (1)	07:08 17:35	06:25 18:08	06:33 19:43	05:51 20:16	05:42 20:43	06:11 20:14	06:43 19:25	07:15 18:32	06:52 16:50	07:25 16:36	13:49 (1) 14:51 (1)	
14	07:35 16:59	14:04 (1) 15:01 (1)	07:07 17:36	06:24 18:09	06:31 19:44	05:50 20:17	05:43 20:43	06:12 20:13	06:44 19:23	07:16 18:30	06:54 16:49	07:26 16:36	13:50 (1) 14:51 (1)	
15	07:35 17:00	14:04 (1) 15:01 (1)	07:06 17:37	06:22 18:10	06:30 19:45	05:49 20:18	05:44 20:42	06:13 20:11	06:45 19:21	07:18 18:28	06:55 16:48	14:06 (1) 14:20 (1)	07:27 16:36	13:51 (1) 14:52 (1)
16	07:35 17:01	14:04 (1) 15:01 (1)	07:05 17:38	06:21 18:11	06:28 19:46	05:48 20:19	05:44 20:42	06:14 20:10	06:46 19:20	07:19 18:27	06:56 16:47	14:03 (1) 14:24 (1)	07:27 16:36	13:50 (1) 14:52 (1)
17	07:35 17:02	14:04 (1) 15:01 (1)	07:04 17:39	06:20 18:12	06:26 19:47	05:47 20:20	05:45 20:42	06:15 20:08	06:47 19:18	07:20 18:25	06:57 16:46	14:00 (1) 14:27 (1)	07:28 16:36	13:51 (1) 14:53 (1)
18	07:35 17:03	14:04 (1) 15:01 (1)	07:03 17:40	06:19 18:13	06:24 19:48	05:46 20:21	05:45 20:42	06:16 20:07	06:49 19:16	07:21 18:24	06:58 16:45	14:01 (1) 14:28 (1)	07:29 16:36	13:52 (1) 14:53 (1)
19	07:35 17:04	14:04 (1) 15:01 (1)	07:02 17:41	06:18 18:14	06:22 19:49	05:45 20:22	05:44 20:42	06:17 20:05	06:50 19:14	07:22 18:22	06:59 16:44	14:02 (1) 14:31 (1)	07:30 16:36	13:53 (1) 14:54 (1)
20	07:35 17:05	14:04 (1) 15:01 (1)	07:01 17:42	06:17 18:15	06:21 19:50	05:44 20:23	05:44 20:42	06:18 20:04	06:51 19:13	07:23 18:20	07:01 16:44	14:03 (1) 14:32 (1)	07:31 16:36	13:54 (1) 14:54 (1)
21	07:35 17:06	14:04 (1) 15:01 (1)	07:00 17:43	06:16 18:16	06:20 19:51	05:43 20:24	05:44 20:42	06:19 20:02	06:52 19:11	07:24 18:19	07:02 16:43	14:04 (1) 14:33 (1)	07:32 16:36	13:55 (1) 14:54 (1)
22	07:35 17:07	14:04 (1) 15:01 (1)	07:00 17:44	06:15 18:17	06:19 19:52	05:43 20:25	05:44 20:42	06:20 20:01	06:53 19:09	07:25 18:17	07:03 16:42	14:05 (1) 14:34 (1)	07:33 16:36	13:56 (1) 14:55 (1)
23	07:35 17:08	14:04 (1) 15:01 (1)	07:00 17:45	06:14 18:18	06:18 19:53	05:43 20:26	05:44 20:42	06:21 20:00	06:54 19:09	07:26 18:16	07:04 16:41	14:06 (1) 14:35 (1)	07:34 16:36	13:57 (1) 14:56 (1)
24	07:35 17:09	14:04 (1) 15:01 (1)	07:00 17:46	06:13 18:19	06:17 19:54	05:43 20:27	05:44 20:42	06:22 20:00	06:55 19:07	07:27 18:15	07:05 16:41	14:07 (1) 14:36 (1)	07:35 16:36	13:58 (1) 14:57 (1)
25	07:35 17:10	14:04 (1) 15:01 (1)	07:00 17:47	06:12 18:20	06:16 19:55	05:43 20:28	05:44 20:42	06:23 20:00	06:56 19:06	07:28 18:14	07:06 16:41	14:08 (1) 14:37 (1)	07:36 16:36	13:59 (1) 14:58 (1)
26	07:35 17:11	14:04 (1) 15:01 (1)	07:00 17:48	06:11 18:21	06:15 19:56	05:43 20:29	05:44 20:42	06:24 20:00	06:57 19:04	07:29 18:13	07:07 16:40	14:09 (1) 14:38 (1)	07:37 16:36	14:00 (1) 14:59 (1)
27	07:35 17:12	14:04 (1) 15:01 (1)	07:00 17:49	06:10 18:22	06:14 19:57	05:43 20:30	05:44 20:42	06:25 20:00	06:58 19:02	07:30 18:12	07:08 16:40	14:10 (1) 14:39 (1)	07:38 16:36	14:01 (1) 15:00 (1)
28	07:35 17:13	14:04 (1) 15:01 (1)	07:00 17:50	06:09 18:23	06:13 19:58	05:43 20:31	05:44 20:42	06:26 20:00	06:59 19:00	07:31 18:10	07:09 16:40	14:11 (1) 14:40 (1)	07:39 16:36	14:02 (1) 15:01 (1)
29	07:35 17:14	14:04 (1) 15:01 (1)	07:00 17:51	06:08 18:24	06:12 19:59	05:43 20:32	05:44 20:42	06:27 20:00	07:00 19:00	07:32 18:09	07:10 16:40	14:12 (1) 14:41 (1)	07:40 16:36	14:03 (1) 15:02 (1)
30	07:35 17:15	14:04 (1) 15:01 (1)	07:00 17:52	06:07 18:25	06:11 20:00	05:43 20:33	05:44 20:42	06:28 20:00	07:01 19:00	07:33 18:09	07:11 16:40	14:13 (1) 14:42 (1)	07:41 16:36	14:04 (1) 15:03 (1)
31	07:35 17:16	14:04 (1) 15:01 (1)	07:00 17:53	06:06 18:26	06:10 20:01	05:43 20:34	05:44 20:42	06:29 20:00	07:02 19:00	07:34 18:08	07:12 16:40	14:14 (1) 14:43 (1)	07:42 16:36	14:05 (1) 15:04 (1)
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285		
Total, worst case	1345										699	1881		
Sun reduction	0.47										0.37	0.35		
Oper. time red.	0.80										0.80	0.80		
Wind dir. red.	0.58										0.58	0.58		
Total reduction	0.22										0.17	0.16		
Total, real	290										120	302		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)		Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 12

Licensed user:

Howard R. Green Company
 8710 Earhar Lane SW
 US-CEDAR RAPIDS, IA 52409
 319 841 4000
 Ted McCaslin / tmccaslin@hrgreen.com
 Calculated:
 12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: J - Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (18)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:35	09:00 (1)	07:21	06:43	06:51	06:04	05:35	05:35	06:00	06:32	07:03	06:39	07:15	08:51 (1)		
16:46	45	09:45 (1)	17:21	17:57	19:31	20:04	20:35	20:46	20:27	19:43	18:50	17:02	16:37	33	09:24 (1)	
2	07:35	09:01 (1)	07:20	06:42	06:49	06:03	05:34	05:36	06:01	06:33	07:04	06:40	07:16	08:52 (1)		
16:47	44	09:45 (1)	17:23	17:58	19:32	20:05	20:35	20:46	20:26	19:42	18:48	17:01	16:37	34	09:26 (1)	
3	07:35	09:02 (1)	07:18	06:40	06:48	06:02	05:34	05:36	06:02	06:34	07:05	06:41	07:17	08:51 (1)		
16:48	43	09:45 (1)	17:24	17:59	19:33	20:06	20:36	20:46	20:25	19:40	18:47	17:00	16:37	36	09:27 (1)	
4	07:35	09:02 (1)	07:17	06:39	06:46	06:00	05:33	05:37	06:03	06:35	07:07	06:42	07:18	08:51 (1)		
16:49	43	09:45 (1)	17:25	18:00	19:34	20:07	20:37	20:46	20:24	19:38	18:45	16:58	16:36	38	09:29 (1)	
5	07:35	09:03 (1)	07:16	06:37	06:44	05:59	05:33	05:37	06:04	06:36	07:08	06:44	07:19	08:51 (1)		
16:50	42	09:45 (1)	17:27	18:00	19:35	20:08	20:38	20:46	20:23	19:37	18:43	16:57	16:36	39	09:30 (1)	
6	07:35	09:04 (1)	07:15	06:35	06:43	05:58	05:33	05:38	06:05	06:37	07:09	06:45	07:20	08:51 (1)		
16:51	41	09:45 (1)	17:28	18:01	19:36	20:09	20:38	20:46	20:22	19:35	18:41	16:56	16:36	40	09:31 (1)	
7	07:35	09:06 (1)	07:14	06:34	06:41	05:57	05:32	05:39	06:06	06:38	07:10	06:46	07:21	08:51 (1)		
16:52	39	09:45 (1)	17:29	18:03	19:38	20:11	20:39	20:45	20:20	19:33	18:40	16:55	16:36	41	09:32 (1)	
8	07:35	09:06 (1)	07:13	07:32	06:39	05:55	05:32	05:39	06:07	06:39	07:11	06:47	07:22	08:51 (1)		
16:53	38	09:44 (1)	17:30	18:04	19:39	20:12	20:40	20:45	20:19	19:32	18:38	16:54	16:36	42	09:33 (1)	
9	07:35	09:07 (1)	07:12	07:30	06:38	05:54	05:32	05:40	06:08	06:40	07:12	06:49	07:23	08:50 (1)		
16:54	36	09:43 (1)	17:32	19:05	19:40	20:13	20:40	20:45	20:18	19:30	18:36	16:53	16:36	43	09:33 (1)	
10	07:35	09:09 (1)	07:10	07:29	06:36	05:53	05:32	05:41	06:09	06:41	07:13	06:50	07:23	08:50 (1)		
16:55	34	09:43 (1)	17:33	19:06	19:41	20:14	20:41	20:44	20:17	19:28	18:35	16:52	16:36	44	09:34 (1)	
11	07:34	09:09 (1)	07:09	07:27	06:34	05:52	05:31	05:41	06:10	06:42	07:14	06:51	07:24	08:50 (1)		
16:56	33	09:42 (1)	17:34	19:07	19:42	20:15	20:41	20:44	20:15	19:27	18:33	16:51	16:36	45	09:35 (1)	
12	07:34	09:11 (1)	07:08	07:25	06:33	05:51	05:31	05:42	06:11	06:43	07:15	06:52	07:25	08:51 (1)		
16:57	31	09:42 (1)	17:36	19:08	19:43	20:16	20:42	20:43	20:14	19:25	18:32	16:50	16:36	44	09:35 (1)	
13	07:34	09:13 (1)	07:07	07:24	06:31	05:50	05:31	05:43	06:12	06:44	07:16	06:54	07:26	08:51 (1)		
16:58	28	09:41 (1)	17:37	19:10	19:44	20:17	20:43	20:43	20:13	19:23	18:30	16:49	16:36	45	09:36 (1)	
14	07:33	09:14 (1)	07:05	07:22	06:30	05:49	05:31	05:44	06:13	06:45	07:18	06:55	07:27	08:51 (1)		
16:59	25	09:39 (1)	17:38	19:11	19:45	20:18	20:43	20:42	20:11	19:21	18:28	16:48	16:36	46	09:37 (1)	
15	07:33	09:17 (1)	07:04	07:20	06:28	05:48	05:31	05:44	06:14	06:46	07:19	06:56	07:27	08:51 (1)		
17:00	21	09:38 (1)	17:39	19:12	19:46	20:19	20:43	20:42	20:10	19:20	18:27	16:47	16:37	46	09:37 (1)	
16	07:32	09:19 (1)	07:03	07:19	06:26	05:47	05:31	05:45	06:15	06:48	07:20	06:57	07:28	08:52 (1)		
17:02	17	09:36 (1)	17:41	19:13	19:47	20:20	20:44	20:41	20:08	19:18	18:25	16:46	16:37	46	09:38 (1)	
17	07:32	09:23 (1)	07:01	07:17	06:25	05:46	05:31	05:46	06:16	06:49	07:21	06:58	07:29	08:52 (1)		
17:03	11	09:34 (1)	17:42	19:14	19:49	20:21	20:44	20:41	20:07	19:16	18:24	16:45	16:37	47	09:39 (1)	
18	07:31	07:00	07:15	06:23	05:45	05:31	05:47	05:47	06:17	06:50	07:22	07:00	07:29	08:52 (1)		
17:04		17:43	19:15	19:50	20:22	20:45	20:40	20:05	19:14	18:22	16:44	16:44	16:37	47	09:39 (1)	
19	07:31	06:58	07:13	06:22	05:44	05:31	05:48	05:48	06:19	06:51	07:23	07:01	07:30	08:53 (1)		
17:05		17:44	19:16	19:51	20:23	20:45	20:39	20:04	19:13	18:21	16:44	16:44	16:38	47	09:40 (1)	
20	07:30	06:57	07:12	06:20	05:43	05:32	05:49	06:20	06:52	07:24	07:02	07:02	07:31	08:53 (1)		
17:06		17:46	19:18	19:52	20:24	20:45	20:38	20:02	19:11	18:19	16:43	16:43	16:38	47	09:40 (1)	
21	07:30	06:55	07:10	06:19	05:42	05:32	05:50	06:21	06:53	07:26	07:03	07:03	07:31	08:54 (1)		
17:08		17:47	19:19	19:53	20:25	20:46	20:38	20:01	19:09	18:17	16:42	16:42	16:39	47	09:41 (1)	
22	07:29	06:54	07:08	06:17	05:41	05:32	05:50	06:22	06:54	07:27	07:04	07:04	07:32	08:54 (1)		
17:09		17:48	19:20	19:54	20:26	20:46	20:37	19:59	19:07	18:16	16:41	16:41	16:39	47	09:41 (1)	
23	07:28	06:53	07:07	06:16	05:40	05:32	05:51	06:23	06:55	07:28	07:06	07:06	07:32	08:55 (1)		
17:10		17:49	19:21	19:55	20:27	20:46	20:36	19:58	19:06	18:15	16:41	16:41	16:40	47	09:42 (1)	
24	07:28	06:51	07:05	06:14	05:40	05:32	05:52	06:24	06:56	07:29	07:07	07:07	07:33	08:55 (1)		
17:11		17:51	19:22	19:56	20:28	20:46	20:35	19:56	19:04	18:13	16:40	16:40	16:40	47	09:42 (1)	
25	07:27	06:50	07:03	06:13	05:39	05:33	05:53	06:25	06:57	07:30	07:08	07:08	07:33	08:56 (1)		
17:13		17:52	19:23	19:57	20:29	20:46	20:34	19:55	19:02	18:12	16:40	11	09:11 (1)	16:41	47	09:43 (1)
26	07:26	06:48	07:01	06:11	05:38	05:33	05:54	06:26	06:58	07:32	07:09	07:09	07:33	08:56 (1)		
17:14		17:53	19:24	19:58	20:30	20:46	20:33	19:53	19:00	18:10	16:39	17	09:15 (1)	16:42	47	09:43 (1)
27	07:25	06:46	07:00	06:10	05:38	05:33	05:55	06:27	06:59	07:33	07:10	07:10	07:34	08:56 (1)		
17:15		17:54	19:25	20:00	20:30	20:47	20:33	19:52	18:57	18:09	16:39	21	09:17 (1)	16:42	47	09:43 (1)
28	07:24	06:45	06:58	06:08	05:37	05:34	05:56	06:28	07:00	07:34	07:11	07:11	07:34	08:57 (1)		
17:16		17:55	19:26	20:01	20:31	20:47	20:32	19:50	18:55	18:07	16:38	25	09:19 (1)	16:43	46	09:43 (1)
29	07:23	06:45	06:56	06:07	05:36	05:34	05:57	06:29	07:01	07:35	07:12	07:12	07:34	08:58 (1)		
17:18		17:58	19:28	20:02	20:32	20:47	20:31	19:48	18:53	18:06	16:38	28	09:21 (1)	16:44	46	09:44 (1)
30	07:22	06:45	06:56	06:06	05:36	05:35	05:58	06:30	07:02	07:36	07:14	07:14	07:35	08:59 (1)		
17:19		17:59	19:29	20:03	20:33	20:47	20:30	19:47	18:52	18:05	16:37	30	09:22 (1)	16:44	45	09:44 (1)
31	07:22	06:45	06:53	06:05	05:35	05:34	05:59	06:31	07:03	07:38	07:16	07:16	07:35	08:59 (1)		
17:20		18:00	19:30	20:04	20:34	20:48	20:28	19:45	18:50	18:03	16:38	16:45	16:45	45	09:44 (1)	
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285				
Total, worst case		571									132		1361			
Sun reduction		0.47									0.37		0.35			
Oper. time red.		0.80									0.80		0.80			
Wind dir. red.		0.72									0.72		0.72			
Total reduction		0.27									0.21		0.20			
Total, real		152									28		270			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 13

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: K - Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (19)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 4.43 5.24 5.95 7.01 8.58 9.67 9.71 8.48 7.21 5.48 3.66 3.19

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 434 328 224 196 144 406 862 868 531 517 1,188 1,272 6,970
 Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:35 16:46	07:21 17:21	06:43 17:57	06:51 19:31	06:04 20:04	07:00 (1) 20:35	05:35 20:46	06:00 20:27	06:32 19:44	06:58 (1) 18:50	07:03 17:02	06:39 16:37
2	07:35 16:47	07:20 17:23	06:42 17:58	06:49 19:32	06:03 20:05	07:01 (1) 20:35	05:36 20:46	06:01 20:26	06:33 19:42	06:59 (1) 18:48	07:04 17:01	06:40 16:37
3	07:35 16:48	07:18 17:24	06:40 17:59	06:48 19:33	06:02 20:06	07:04 (1) 20:36	05:36 20:46	06:02 20:25	06:34 19:40	07:00 (1) 18:47	07:05 17:00	06:41 16:37
4	07:35 16:49	07:17 17:25	06:39 18:00	06:46 19:34	06:00 20:07	07:05 (1) 20:37	05:37 20:46	06:03 20:24	06:35 19:38	07:01 (1) 18:45	07:07 16:58	06:43 16:36
5	07:35 16:50	07:16 17:27	06:37 18:00	06:44 19:35	06:00 20:08	07:11 (1) 20:38	05:59 20:46	06:04 20:23	06:36 19:37	07:02 (1) 18:43	07:08 16:57	06:44 16:36
6	07:35 16:51	07:15 17:28	06:35 18:01	06:43 19:36	06:00 20:09	07:08 (1) 20:39	05:58 20:46	06:05 20:22	06:37 19:35	07:04 (1) 18:42	07:09 16:56	06:45 16:36
7	07:35 16:52	07:14 17:29	06:34 18:03	06:41 19:37	06:00 20:10	07:05 (1) 20:40	05:57 20:46	06:06 20:20	06:38 19:33	07:06 (1) 18:40	07:10 16:55	06:46 16:36
8	07:35 16:53	07:13 17:30	06:32 18:04	06:39 19:38	06:00 20:11	07:04 (1) 20:41	05:55 20:46	06:07 20:19	06:39 19:32	07:10 (1) 18:38	07:11 16:54	06:47 16:36
9	07:35 16:54	07:12 17:31	06:30 18:04	06:38 19:39	06:00 20:12	07:02 (1) 20:42	05:54 20:46	06:08 20:18	06:40 19:30	07:14 (1) 18:37	07:12 16:53	06:49 16:36
10	07:35 16:55	07:10 17:32	06:29 19:05	06:36 19:40	06:00 20:13	07:00 (1) 20:43	05:53 20:46	06:09 20:16	06:41 19:30	07:12 (1) 18:36	07:13 16:53	06:50 16:36
11	07:35 16:56	07:09 17:33	06:27 19:06	06:34 19:41	06:00 20:14	07:00 (1) 20:44	05:52 20:46	06:10 20:17	06:42 19:28	07:10 (1) 18:35	07:14 16:52	06:51 16:36
12	07:35 16:57	07:08 17:34	06:25 19:07	06:33 19:42	06:00 20:15	06:58 (1) 20:45	05:51 20:46	06:11 20:15	06:43 19:27	07:08 (1) 18:33	07:15 16:51	06:52 16:36
13	07:35 16:58	07:07 17:35	06:24 19:08	06:31 19:43	06:00 20:16	06:57 (1) 20:46	05:50 20:46	06:12 20:14	06:44 19:25	07:06 (1) 18:32	07:16 16:50	06:54 16:36
14	07:35 16:59	07:05 17:36	06:22 19:09	06:30 19:44	06:00 20:17	06:56 (1) 20:47	05:49 20:46	06:13 20:13	06:45 19:23	07:05 (1) 18:30	07:18 16:49	06:55 16:36
15	07:35 17:00	07:04 17:37	06:20 19:11	06:28 19:45	06:00 20:18	06:55 (1) 20:48	05:48 20:46	06:14 20:11	06:46 19:21	07:04 (1) 18:28	07:19 16:48	06:56 16:36
16	07:35 17:01	07:03 17:38	06:19 19:12	06:26 19:46	06:00 20:19	06:54 (1) 20:49	05:47 20:46	06:15 20:10	06:48 19:20	07:03 (1) 18:27	07:20 16:47	06:57 16:37
17	07:35 17:02	07:01 17:39	06:17 19:13	06:25 19:47	06:00 20:20	06:53 (1) 20:50	05:46 20:46	06:16 20:08	06:49 19:18	07:02 (1) 18:25	07:21 16:46	06:58 16:37
18	07:35 17:03	07:00 17:40	06:15 19:14	06:23 19:49	06:00 20:21	06:52 (1) 20:51	05:45 20:46	06:17 20:07	06:50 19:16	07:01 (1) 18:24	07:22 16:45	07:00 16:37
19	07:35 17:04	06:58 17:41	06:13 19:15	06:22 19:50	06:00 20:22	06:51 (1) 20:52	05:44 20:46	06:19 20:05	06:51 19:14	07:00 (1) 18:22	07:23 16:44	07:01 16:38
20	07:35 17:05	06:57 17:42	06:12 19:16	06:20 19:51	06:00 20:23	06:50 (1) 20:53	05:43 20:46	06:20 20:04	06:52 19:13	07:00 (1) 18:21	07:24 16:44	07:02 16:38
21	07:35 17:06	06:56 17:43	06:11 19:17	06:19 19:52	06:00 20:24	06:49 (1) 20:54	05:42 20:46	06:21 20:02	06:53 19:11	07:01 (1) 18:19	07:25 16:43	07:03 16:38
22	07:35 17:07	06:55 17:44	06:10 19:18	06:18 19:53	06:00 20:25	06:48 (1) 20:55	05:41 20:46	06:22 20:01	06:54 19:09	07:02 (1) 18:18	07:26 16:42	07:04 16:39
23	07:35 17:08	06:54 17:45	06:09 19:19	06:17 19:54	06:00 20:26	06:47 (1) 20:56	05:40 20:46	06:23 19:59	06:54 19:07	07:03 (1) 18:16	07:27 16:41	07:05 16:39
24	07:35 17:09	06:53 17:46	06:08 19:20	06:16 19:55	06:00 20:27	06:46 (1) 20:57	05:39 20:46	06:24 19:58	06:55 19:06	07:04 (1) 18:15	07:28 16:41	07:06 16:40
25	07:35 17:10	06:52 17:47	06:07 19:21	06:15 19:56	06:00 20:28	06:45 (1) 20:58	05:38 20:46	06:25 19:56	06:56 19:04	07:05 (1) 18:13	07:29 16:40	07:07 16:40
26	07:35 17:11	06:51 17:48	06:06 19:22	06:14 19:57	06:00 20:29	06:44 (1) 20:59	05:37 20:46	06:26 19:55	06:57 19:02	07:06 (1) 18:12	07:30 16:40	07:08 16:41
27	07:35 17:12	06:50 17:49	06:05 19:23	06:13 19:58	06:00 20:30	06:43 (1) 21:00	05:36 20:46	06:27 19:53	06:58 19:00	07:07 (1) 18:10	07:31 16:39	07:09 16:42
28	07:35 17:13	06:49 17:50	06:04 19:24	06:12 19:59	06:00 20:31	06:42 (1) 21:01	05:35 20:46	06:28 19:52	06:59 18:57	07:08 (1) 18:09	07:32 16:39	07:10 16:42
29	07:35 17:14	06:48 17:51	06:03 19:25	06:11 20:00	06:00 20:32	06:41 (1) 21:02	05:34 20:46	06:29 19:50	06:59 18:55	07:09 (1) 18:07	07:33 16:38	07:11 16:43
30	07:35 17:15	06:47 17:52	06:02 19:26	06:10 20:01	06:00 20:33	06:40 (1) 21:03	05:33 20:46	06:30 19:50	06:59 18:53	07:10 (1) 18:06	07:34 16:37	07:12 16:44
31	07:35 17:16	06:46 17:53	06:01 19:27	06:09 20:02	06:00 20:34	06:39 (1) 21:04	05:32 20:46	06:31 19:48	06:59 18:52	07:11 (1) 18:05	07:35 16:36	07:13 16:44
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285
Total, worst case				977	87			855	220			
Sun reduction				0.53	0.59			0.61	0.58			
Oper. time red.				0.80	0.80			0.80	0.80			
Wind dir. red.				0.60	0.60			0.60	0.60			
Total reduction				0.25	0.28			0.29	0.28			
Total, real				246	25			250	61			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

121310_Kirkwood Wind-Energy Facility

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12/15/2010 10:25 AM / 14

Licensed user:

Howard R. Green Company

8710 Earhar Lane SW

US-CEDAR RAPIDS, IA 52409

319 841 4000

Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar

Shadow receptor: L - Shadow Receptor: 2.0 x 1.0 Azimuth: -180.0° Slope: 90.0° (20)

Assumptions for shadow calculations

Maximum distance for influence 200 m
 Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [MADISON]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.43	5.24	5.95	7.01	8.58	9.67	9.71	8.48	7.21	5.48	3.66	3.19

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	328	224	196	144	406	862	868	531	517	1,188	1,272	6,970

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:35	07:21	06:43	06:51	07:55 (1)	06:04	05:35	05:35	06:00	06:32	07:03	07:39 (1)	06:39	07:15		
	16:46	17:21	17:57	19:31	08:24 (1)	20:04	20:35	20:46	20:27	19:44	18:50	08:12 (1)	17:02	16:37		
2	07:35	07:20	06:42	06:49	07:57 (1)	06:03	05:34	05:36	06:01	06:33	07:04	07:41 (1)	06:40	07:16		
	16:47	17:23	17:58	19:32	08:22 (1)	20:05	20:35	20:46	20:26	19:42	18:48	29	08:10 (1)	17:01	16:37	
3	07:35	07:18	06:40	06:48	07:59 (1)	06:02	05:34	05:36	06:02	06:34	07:05	07:42 (1)	06:41	07:17		
	16:48	17:24	17:59	19:33	08:19 (1)	20:06	20:36	20:46	20:25	19:40	18:47	25	08:07 (1)	17:00	16:37	
4	07:35	07:17	06:39	06:46	08:01 (1)	06:00	05:33	05:37	06:03	06:35	07:07	07:45 (1)	06:43	07:18		
	16:49	17:25	18:00	19:34	08:15 (1)	20:07	20:37	20:46	20:24	19:38	18:45	20	08:05 (1)	16:58	16:36	
5	07:35	07:16	06:37	06:44	05:59	05:33	05:37	06:04	06:36	07:08	07:49 (1)	06:44	07:19	07:19		
	16:50	17:27	18:00	19:35	06:08	20:08	20:38	20:46	20:23	19:37	18:43	12	06:01 (1)	16:57	16:36	
6	07:35	07:15	06:35	06:43	05:58	05:33	05:38	06:05	06:37	07:09	07:50	06:45	07:20	07:20		
	16:51	17:28	18:01	19:36	06:09	20:09	20:38	20:46	20:22	19:35	18:42	16:56	16:36	16:36		
7	07:35	07:14	06:34	06:41	05:57	05:32	05:39	06:06	06:38	07:10	07:10	06:46	07:21	07:21		
	16:52	17:29	18:03	19:38	06:11	20:11	20:39	20:45	20:20	19:33	18:40	16:55	16:36	16:36		
8	07:35	07:13	07:32	08:15 (1)	06:39	05:55	05:32	05:39	06:07	06:39	07:57 (1)	07:11	06:47	07:22		
	16:53	17:30	18:04	6	08:21 (1)	19:39	20:12	20:40	20:45	20:19	19:32	13	08:10 (1)	18:38	16:54	16:36
9	07:35	07:12	07:30	08:09 (1)	06:38	05:54	05:32	05:40	06:08	06:40	07:53 (1)	07:12	06:49	07:23	07:23	
	16:54	17:32	19:05	17	08:26 (1)	19:40	20:13	20:40	20:45	20:18	19:30	20	08:13 (1)	18:36	16:53	16:36
10	07:35	07:10	07:29	08:05 (1)	06:36	05:53	05:32	05:41	06:09	06:41	07:50 (1)	07:13	06:50	07:23	07:23	
	16:55	17:33	19:06	24	08:29 (1)	19:41	20:14	20:41	20:44	20:17	19:28	25	08:15 (1)	18:35	16:52	16:36
11	07:34	07:09	07:27	08:03 (1)	06:34	05:52	05:32	05:41	06:10	06:42	07:48 (1)	07:14	06:51	07:24	07:24	
	16:56	17:34	19:07	27	08:30 (1)	19:42	20:15	20:42	20:44	20:15	19:27	29	08:17 (1)	18:33	16:51	16:36
12	07:34	07:08	07:25	08:01 (1)	06:33	05:51	05:31	05:42	06:11	06:43	07:46 (1)	07:15	06:52	07:25	07:25	
	16:57	17:36	19:08	31	08:32 (1)	19:43	20:16	20:42	20:43	20:14	19:25	32	08:18 (1)	18:32	16:50	16:36
13	07:34	07:07	07:24	07:59 (1)	06:31	05:50	05:31	05:43	06:12	06:44	07:45 (1)	07:16	06:54	07:26	07:26	
	16:58	17:37	19:10	34	08:33 (1)	19:44	20:17	20:43	20:43	20:13	19:23	34	08:19 (1)	18:30	16:49	16:36
14	07:33	07:05	07:22	07:58 (1)	06:30	05:49	05:31	05:44	06:13	06:45	07:43 (1)	07:18	06:55	07:27	07:27	
	16:59	17:38	19:11	36	08:34 (1)	19:45	20:18	20:43	20:42	20:11	19:21	37	08:20 (1)	18:28	16:48	16:36
15	07:33	07:04	07:20	07:57 (1)	06:28	05:48	05:31	05:44	06:14	06:46	07:42 (1)	07:19	06:56	07:27	07:27	
	17:00	17:39	19:12	38	08:35 (1)	19:46	20:19	20:43	20:42	20:10	19:20	38	08:20 (1)	18:27	16:47	16:37
16	07:32	07:03	07:19	07:56 (1)	06:26	05:47	05:31	05:45	06:15	06:48	07:41 (1)	07:20	06:57	07:28	07:28	
	17:02	17:41	19:13	39	08:35 (1)	19:47	20:20	20:44	20:41	20:08	19:18	40	08:21 (1)	18:25	16:46	16:37
17	07:32	07:01	07:17	07:54 (1)	06:25	05:46	05:31	05:46	06:16	06:49	07:40 (1)	07:21	06:58	07:29	07:29	
	17:03	17:42	19:14	41	08:35 (1)	19:49	20:21	20:44	20:41	20:07	19:16	41	08:21 (1)	18:24	16:45	16:37
18	07:31	07:00	07:15	07:54 (1)	06:23	05:45	05:31	05:47	06:17	06:50	07:39 (1)	07:22	07:00	07:29	07:29	
	17:04	17:43	19:15	42	08:36 (1)	19:50	20:22	20:45	20:40	20:05	19:14	42	08:21 (1)	18:22	16:44	16:37
19	07:31	06:58	07:13	07:53 (1)	06:22	05:44	05:31	05:48	06:19	06:51	07:38 (1)	07:23	07:01	07:30	07:30	
	17:05	17:44	19:16	43	08:36 (1)	19:51	20:23	20:45	20:39	20:04	19:13	43	08:21 (1)	18:21	16:44	16:38
20	07:30	06:57	07:12	07:52 (1)	06:20	05:43	05:32	05:49	06:20	06:52	07:38 (1)	07:24	07:02	07:31	07:31	
	17:06	17:46	19:18	44	08:36 (1)	19:52	20:24	20:45	20:38	20:02	19:11	43	08:21 (1)	18:19	16:43	16:38
21	07:30	06:55	07:10	07:52 (1)	06:19	05:42	05:32	05:50	06:21	06:53	07:37 (1)	07:26	07:03	07:31	07:31	
	17:08	17:47	19:19	43	08:35 (1)	19:53	20:25	20:46	20:38	20:01	19:09	44	08:21 (1)	18:18	16:42	16:39
22	07:29	06:54	07:08	07:52 (1)	06:17	05:41	05:32	05:50	06:22	06:54	07:37 (1)	07:27	07:04	07:32	07:32	
	17:09	17:48	19:20	44	08:36 (1)	19:54	20:26	20:46	20:37	19:59	19:07	44	08:21 (1)	18:16	16:41	16:39
23	07:28	06:53	07:07	07:51 (1)	06:16	05:40	05:32	05:51	06:23	06:55	07:37 (1)	07:28	07:06	07:32	07:32	
	17:10	17:49	19:21	44	08:35 (1)	19:55	20:27	20:46	20:36	19:58	19:06	43	08:20 (1)	18:15	16:41	16:40
24	07:28	06:51	07:05	07:51 (1)	06:14	05:40	05:32	05:52	06:24	06:56	07:37 (1)	07:29	07:07	07:33	07:33	
	17:11	17:51	19:22	43	08:34 (1)	19:56	20:28	20:46	20:35	19:56	19:04	43	08:20 (1)	18:13	16:40	16:40
25	07:27	06:50	07:03	07:51 (1)	06:13	05:39	05:33	05:53	06:25	06:57	07:37 (1)	07:30	07:08	07:33	07:33	
	17:13	17:52	19:23	42	08:33 (1)	19:57	20:29	20:46	20:34	19:55	19:02	42	08:19 (1)	18:12	16:40	16:41
26	07:26	06:48	07:01	07:52 (1)	06:11	05:38	05:33	05:54	06:26	06:58	07:37 (1)	07:32	07:09	07:33	07:33	
	17:14	17:53	19:24	41	08:33 (1)	19:58	20:30	20:46	20:33	19:53	19:00	41	08:18 (1)	18:10	16:39	16:42
27	07:25	06:46	07:00	07:52 (1)	06:10	05:38	05:33	05:55	06:27	06:59	07:37 (1)	07:33	07:10	07:34	07:34	
	17:15	17:54	19:25	40	08:32 (1)	20:00	20:30	20:47	20:33	19:52	18:57	40	08:17 (1)	18:09	16:39	16:42
28	07:24	06:45	06:58	07:52 (1)	06:08	05:37	05:34	05:56	06:28	07:00	07:37 (1)	07:34	07:11	07:34	07:34	
	17:16	17:55	19:26	38	08:30 (1)	20:01	20:31	20:47	20:32	19:50	18:55	39	08:16 (1)	18:07	16:38	16:43
29	07:23	06:56	07:06	07:53 (1)	06:07	05:36	05:34	05:57	06:29	07:01	07:38 (1)	07:35	07:12	07:34	07:34	
	17:18	17:58	19:28	37	08:30 (1)	20:02	20:32	20:47	20:31	19:48	18:53	37	08:15 (1)	18:06	16:38	16:44
30	07:22	06:55	07:06	07:53 (1)	06:06	05:36	05:35	05:58	06:30	07:02	07:38 (1)	07:36	07:14	07:35	07:35	
	17:19	17:59	19:29	35	08:28 (1)	20:03	20:33	20:47	20:30	19:47	18:52	35	08:13 (1)	18:05	16:37	16:44
31	07:22	06:53	07:04	07:54 (1)	06:05	05:35	05:34	05:59	06:31	07:03	07:38	07:36	07:15	07:35	07:35	
	17:20	18:00	19:30	32	08:26 (1)	20:04	20:34	20:48	20:28	19:45	18:03	32	08:12 (1)	18:03	16:45	16:45
Potential sun hours	295	296	369	400	450	455	462	430	376	344	296	285				
Total, worst case			861	88					845	119						
Sun reduction			0.50	0.53					0.58	0.49						
Oper. time red.			0.80	0.80					0.80	0.80						
Wind dir. red.			0.64	0.64					0.64	0.64						
Total reduction			0.25	0.27					0.29	0.25						
Total,																

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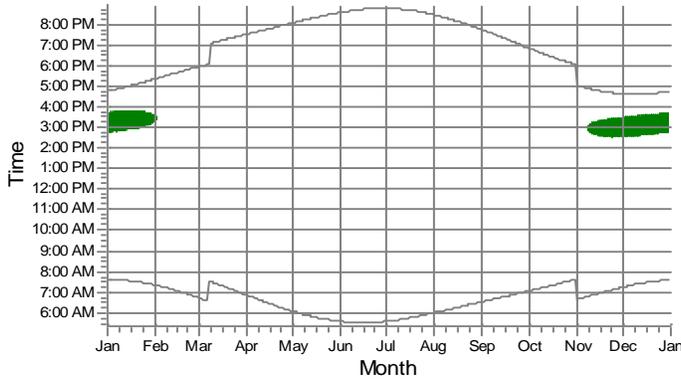
Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

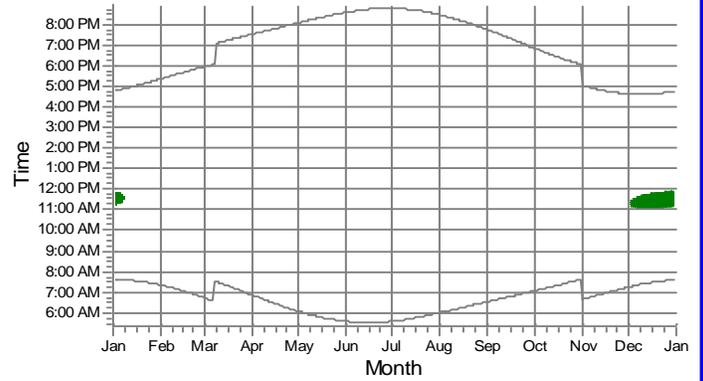
12/13/2010 3:06 PM/2.7.473

SHADOW - Calendar, graphical

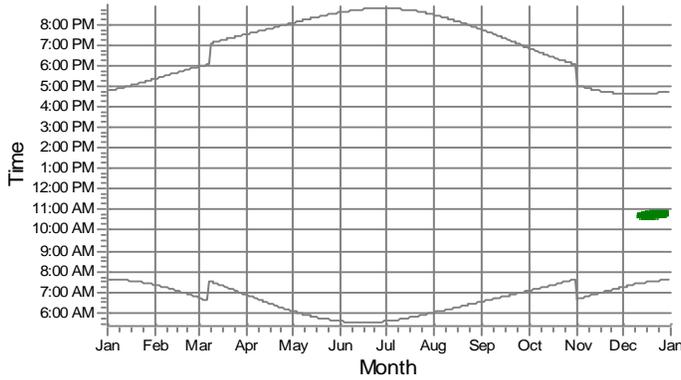
A: Shadow Receptor: 2.0 x 2.0 Azimuth: 40.0° Slope: 90.0° (9)



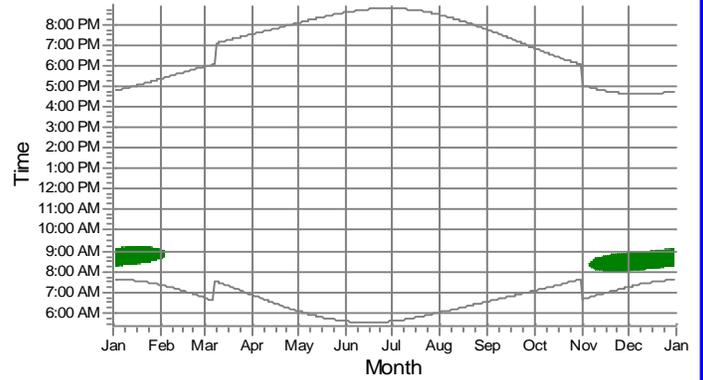
B: Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (10)



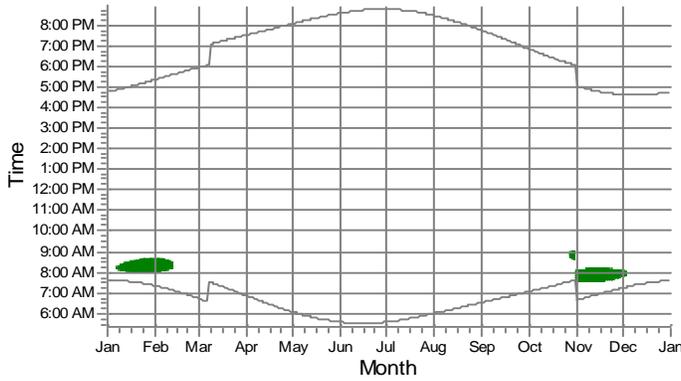
C: Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (11)



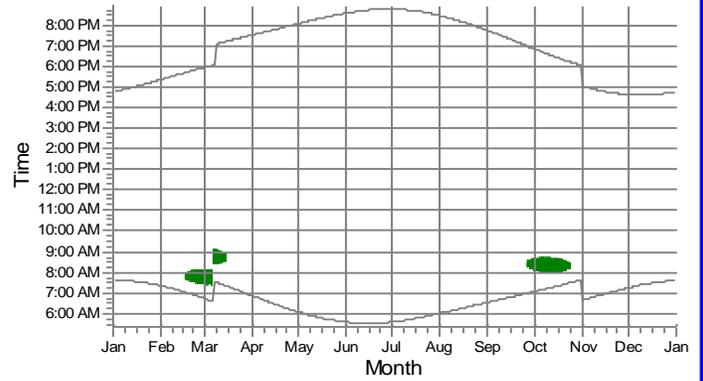
D: Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (12)



E: Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (13)



F: Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (14)



WTGs



1: CLIPPER CW99 Liberty 2500 99.0 !O! hub: 80.0 m (3)

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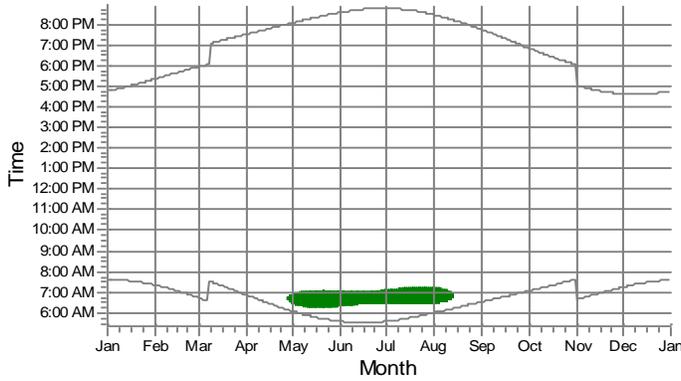
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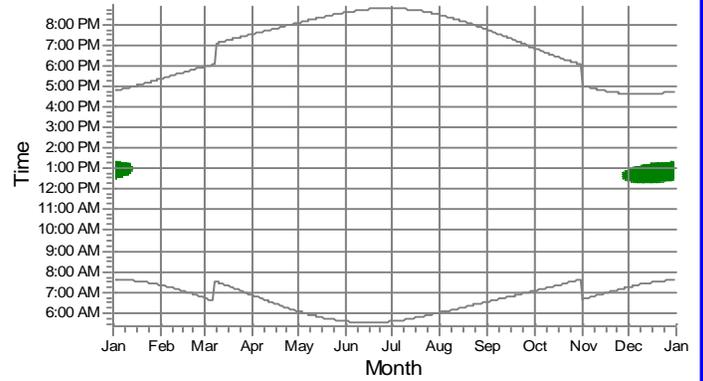
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SHADOW - Calendar, graphical

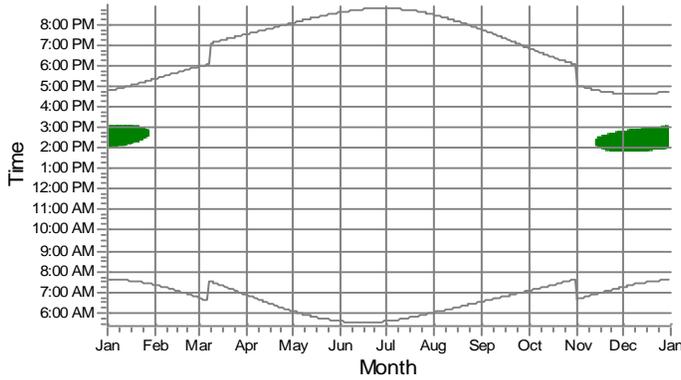
G: Shadow Receptor: 2.0 x 2.0 Azimuth: 0.0° Slope: 90.0° (15)



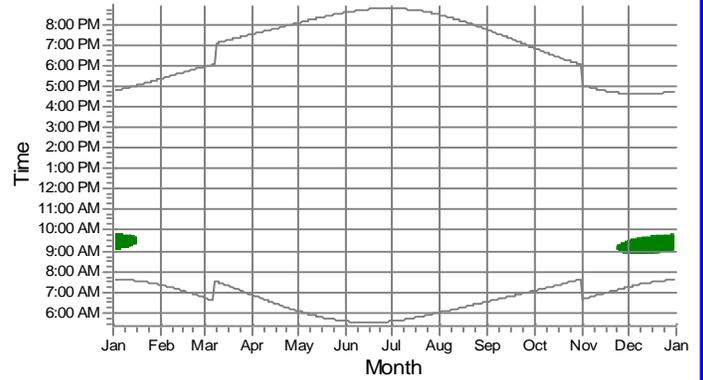
H: Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (16)



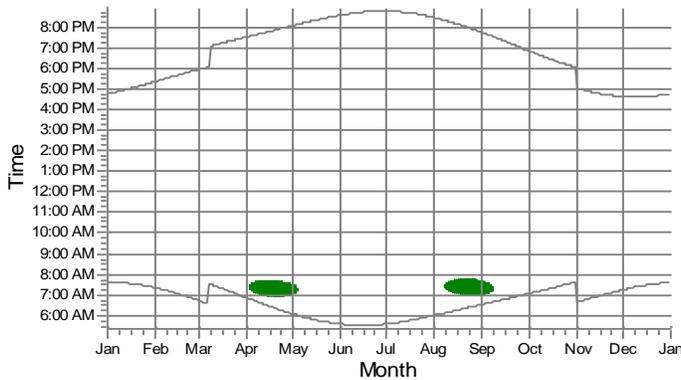
I: Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (17)



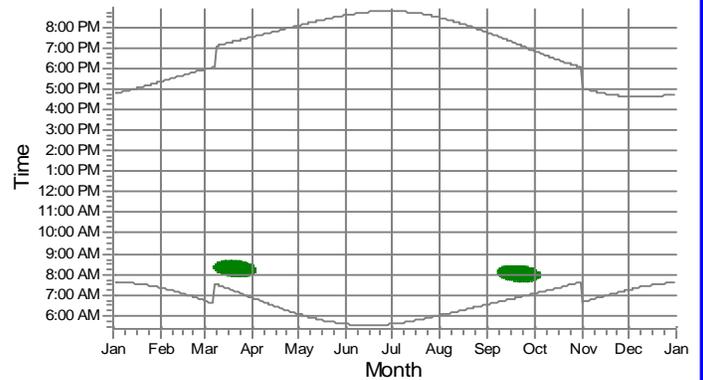
J: Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (18)



K: Shadow Receptor: 2.0 x 2.0 Azimuth: -180.0° Slope: 90.0° (19)



L: Shadow Receptor: 2.0 x 1.0 Azimuth: -180.0° Slope: 90.0° (20)



WTGs

1: CLIPPER CW99 Liberty 2500 99.0 !O! hub: 80.0 m (3)

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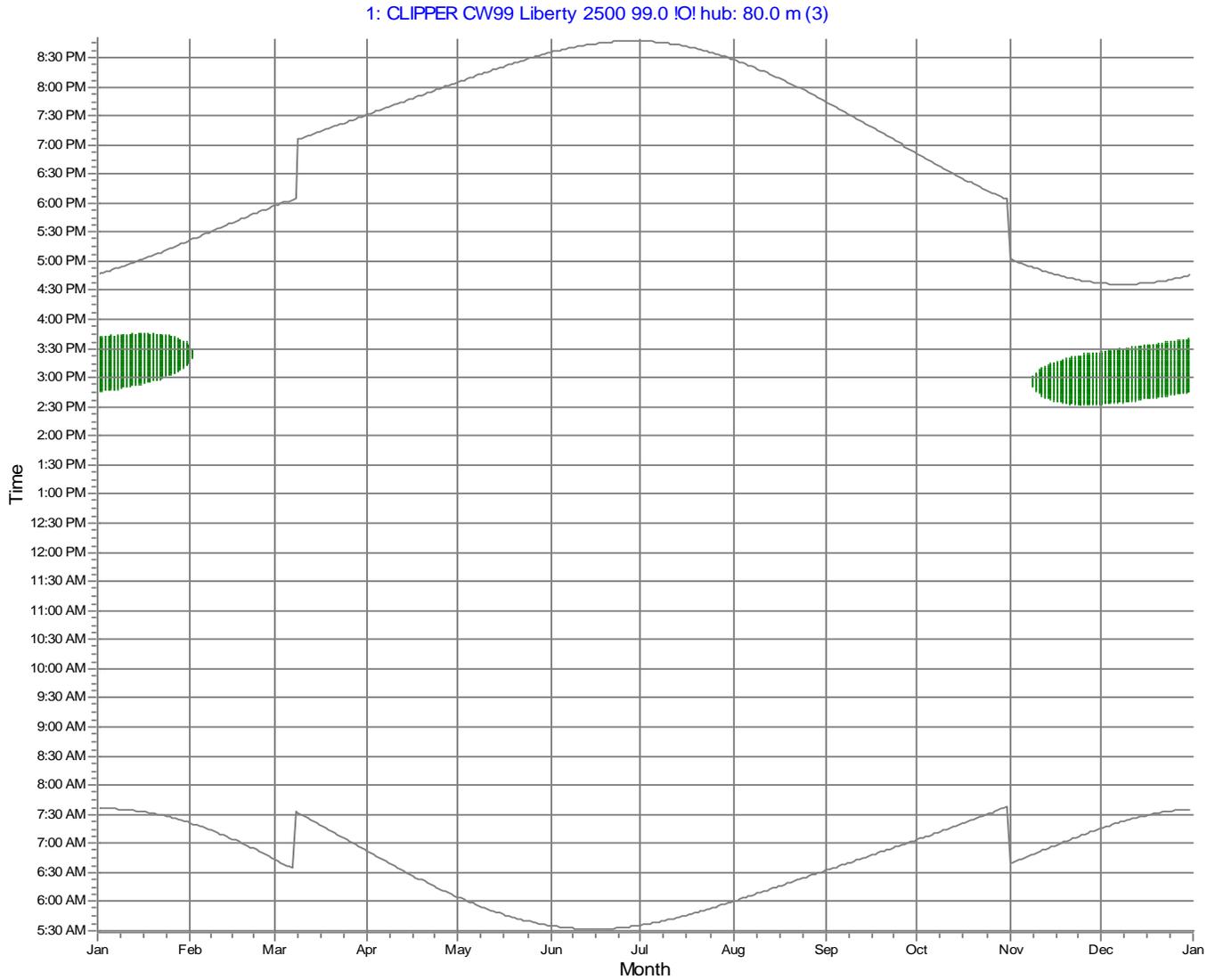
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Calculated:

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SHADOW - Calendar per WTG, graphical

WTG: 1 - CLIPPER CW99 Liberty 2500 99.0 !O! hub: 80.0 m (3)



WTGs

A: Shadow Receptor: 2.0 x 2.0 Azimuth: 40.0° Slope: 90.0° (9)

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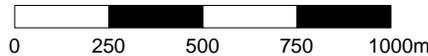
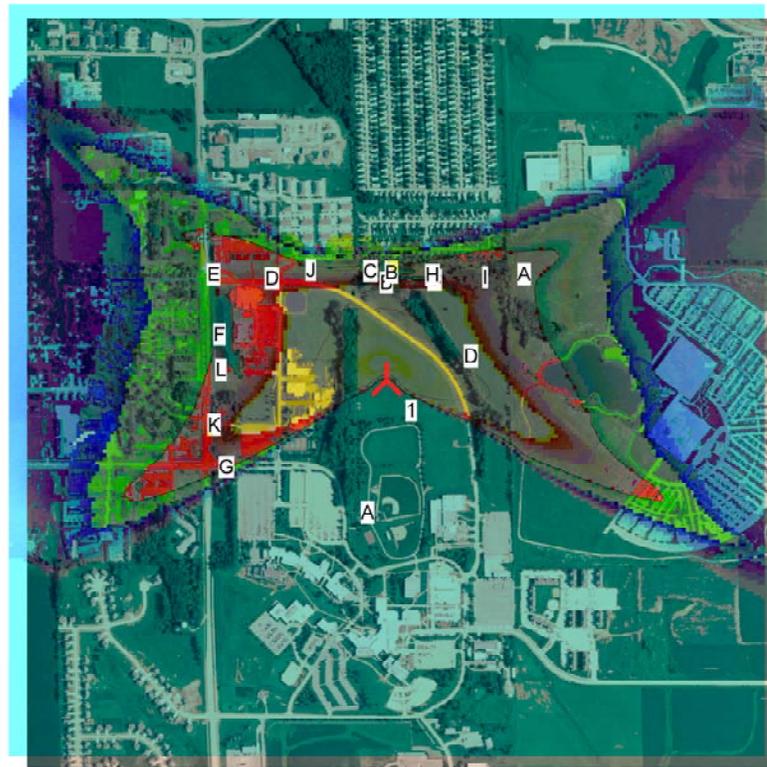
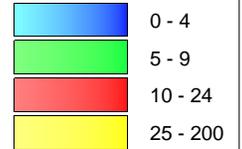
Calculated:

12/13/2010 3:06 PM/2.7.473

SHADOW - Map

WTG: 1 - CLIPPER CW99 Liberty 2500 99.0 !O! hub: 80.0 m (3)

Hours per year, real case



Map: , Print scale 1:20,000, Map center UTM NAD 83 Zone: 15 East: 611,880 North: 4,641,400

New WTG

Obstacle

Shadow receptor

Isolines showing shadow in Hours per year, real case

0

5

10

50

Sound Analysis

The WindPRO Version 2.7.473 DECIBEL extension model was used to model noise emissions and check if noise requirements are met at noise sensitive areas (NSAs) near the proposed Kirkwood Wind Energy Facility. The model setup and assumptions for the noise analysis are described below. Results are shown on the attached DECIBEL model report and GIS Figure. The turbine location, setup and type (Clipper CW99 Liberty 2500kW) from the Shadow Flicker analysis.

The ISO 9613-2 General Attenuation of Sound During Propagation Outdoors noise calculation model was used for wind speeds 8.0 m/s, 10.0 m/s and 12.0 m/s. The 8.0 m/s minimum wind speed model was selected as the lowest speed at which maximum sound power level is generated by the CW99 (107 dB +/- 2 dB), according to specifications forwarded by Clipper. The 107 dB sound power was used for all calculations.

The ground attenuation factor was set at 0.0. This assumes the ground is all hard surfaces during the winter months, when the least ground attenuation is expected. (Note: A decrease of up to 7 dB(A) was modeled at NSAs when a 70% porous ground surface is assumed.) The City of Cedar Rapids does not have a pure tone noise ordinance so a place holder pure tone penalty 0.0 dB(A) was included in the model.

Generic octave data and other noise data built into the SHADOW extension for the Clipper CW99 was used. Clipper was contacted to obtain octave data but declined to release it for the purpose of this study.

Six NSAs were drawn into the project maps. These include: Kirkwood Estates mobile home park north of the proposed turbine location (A), apartments north and west of the proposed turbine location (B, C, and E), single family homes west of the proposed turbine (D), and duplexes west of the proposed turbine location (F). Noise level demands were set to be consistent with the City of Cedar Rapids nighttime demands for residences – 50 dB(A).



Proposed Turbine Location



Noise Sensitive Areas

Noise Model Results (8.0 m/s)

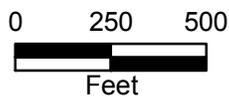
35 dB(A)

40 dB(A)

45 dB(A)

50 dB(A)

55 dB(A)



WindPRO DECIBEL Results

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa



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Calculated:

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DECIBEL - Main Result

Noise calculation model:

ISO 9613-2 General

Wind speed:

8.0 m/s - 12.0 m/s, step 2.0 m/s

Ground attenuation:

General, Ground factor: 0.0

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

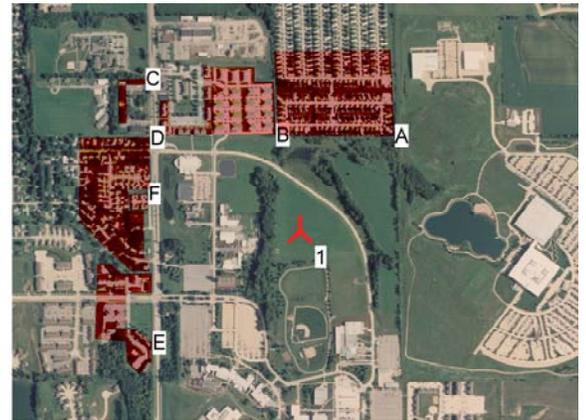
Pure tone penalty are added to demand: 0.0 dB(A)

Height above ground level, when no value in NSA object:

0.0 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)



Scale 1:25,000

New WTG

Noise sensitive area

WTGs

UTM NAD83 Zone: 15				WTG type			Noise data										
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	First wind speed	LwaRef	Last wind speed	LwaRef	Pure tones	Octave data
			[m]				[kW]	[m]	[m]		Max dB	[m/s]	[dB(A)]	[m/s]	[dB(A)]		
1	611,880	4,641,399	807.9	CLIPPER CW99 Liberty 2500... Yes	CLIPPER	CW99 Liberty-2,500	2,500	99.0	80.0	USER	Max dB	8.0	107.0	12.0	107.0	No	Generic *

*Notice: One or more noise data for this WTG is generic or input by user

Calculation Results

Sound Level

Noise sensitive area		UTM NAD83 Zone: 15			Demands		Sound Level	Demands fulfilled ?
No.	Name	East	North	Z	Emission height	Max Noise	Max From WTGs	Noise
		[m]			[m]	[dB(A)]	[dB(A)]	
A	Kirkwood Estates	611,882	4,641,717	777.2	0.0	0.0	47.2	Yes
B	Kirkwood Courts	611,798	4,641,719	793.6	0.0	0.0	46.9	Yes
C	Apartments	611,304	4,641,755	785.3	0.0	0.0	40.2	Yes
D	Single Family	611,379	4,641,304	787.5	0.0	0.0	43.0	Yes
E	Multi-Family	611,385	4,641,257	818.9	0.0	0.0	43.0	Yes
F	SingleFamily	611,373	4,641,468	781.0	0.0	0.0	42.9	Yes

Distances (m)

WTG	
NSA	1
A	318
B	330
C	677
D	510
E	515
F	512

Project:

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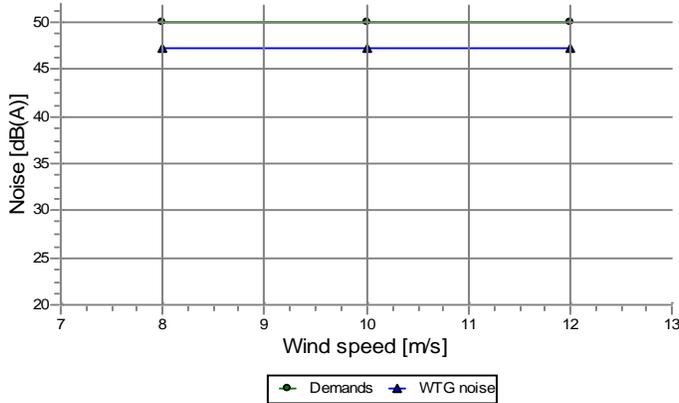
Calculated:

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DECIBEL - Detailed results

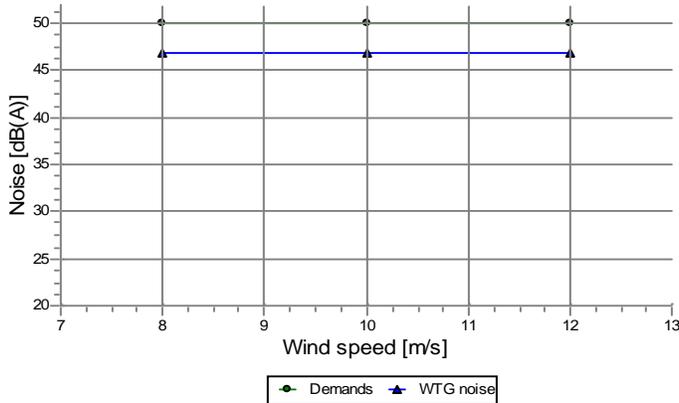
Noise calculation model: ISO 9613-2 General

Kirkwood Estates (A)



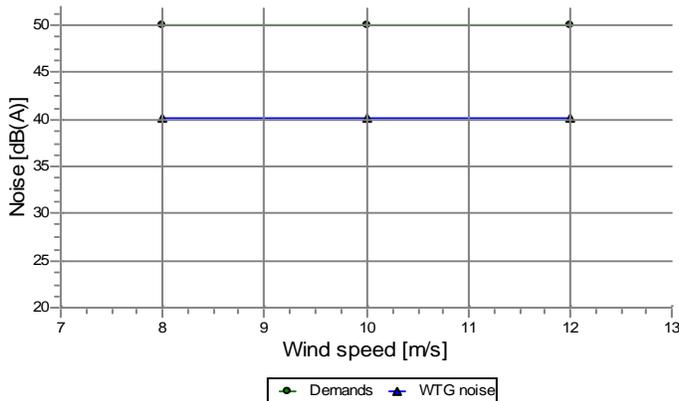
Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
8.0	50.0	47.2	Yes
10.0	50.0	47.2	Yes
12.0	50.0	47.2	Yes

Kirkwood Courts (B)



Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
8.0	50.0	46.9	Yes
10.0	50.0	46.9	Yes
12.0	50.0	46.9	Yes

Apartments (C)



Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
8.0	50.0	40.2	Yes
10.0	50.0	40.2	Yes
12.0	50.0	40.2	Yes

Project:

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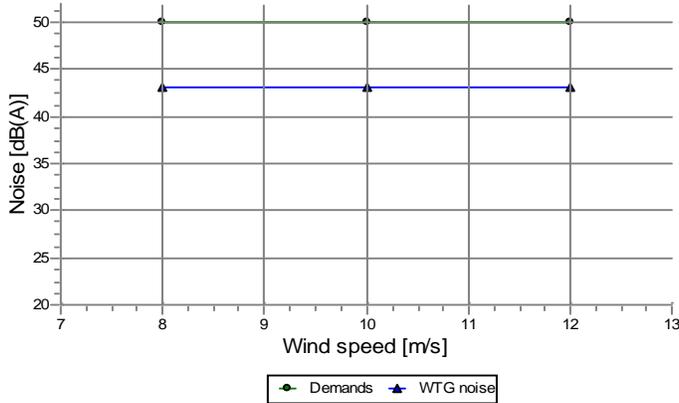
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DECIBEL - Detailed results

Noise calculation model: ISO 9613-2 General

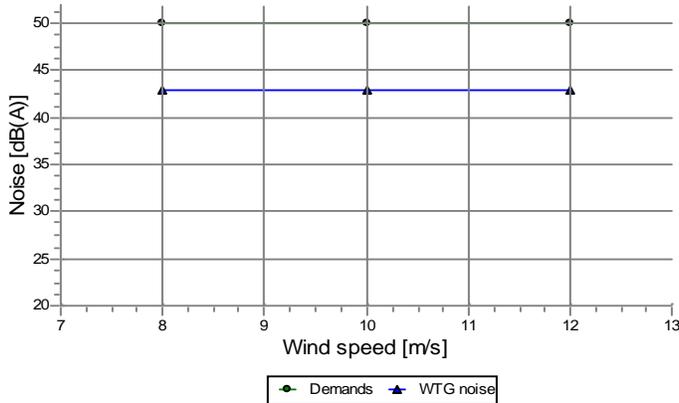
Single Family (D)



Sound Level

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
8.0	50.0	43.0	Yes
10.0	50.0	43.0	Yes
12.0	50.0	43.0	Yes

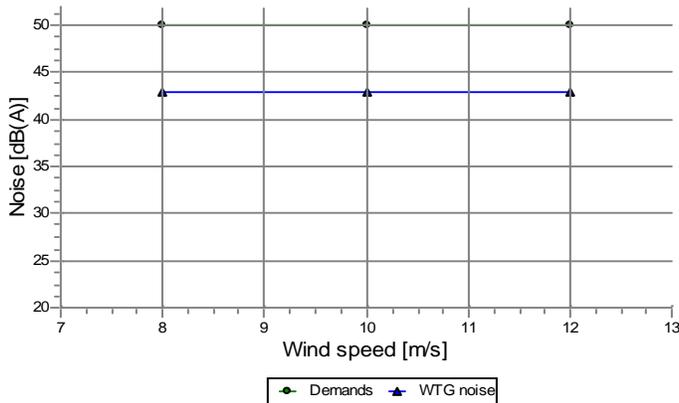
Multi-Family (E)



Sound Level

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
8.0	50.0	43.0	Yes
10.0	50.0	43.0	Yes
12.0	50.0	43.0	Yes

SingleFamily (F)



Sound Level

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
8.0	50.0	42.9	Yes
10.0	50.0	42.9	Yes
12.0	50.0	42.9	Yes

Project:

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Calculated:

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DECIBEL - Assumptions for noise calculation

Noise calculation model: ISO 9613-2 General

Noise calculation model:

ISO 9613-2 General

Wind speed:

8.0 m/s - 12.0 m/s, step 2.0 m/s

Ground attenuation:

General, Ground factor: 0.0

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure tone penalty are added to demand: 0.0 dB(A)

Height above ground level, when no value in NSA object:

0.0 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)

Octave data required

Air absorption

63	125	250	500	1,000	2,000	4,000	8,000
[dB/km]							
0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

WTG: CLIPPER CW99 Liberty 2500 99.0 !O!

Noise: Max dB

Source	Source/Date	Creator	Edited
Clipper	12/6/2010	USER	12/6/2010 5:17 PM

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	Octave data								
					63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]	
User value	80.0	8.0	107.0	No	Generic data	88.6	95.6	99.0	101.6	101.4	98.5	93.7	84.2
User value	80.0	10.0	107.0	No	Generic data	88.6	95.6	99.0	101.6	101.4	98.5	93.7	84.2
User value	80.0	12.0	107.0	No	Generic data	88.6	95.6	99.0	101.6	101.4	98.5	93.7	84.2

NSA: Kirkwood Estates-A

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand:

8.0 [m/s] 10.0 [m/s] 12.0 [m/s]
50.0 dB(A) 50.0 dB(A) 50.0 dB(A)

Distance demand: 0.0 m

NSA: Kirkwood Courts-B

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand:

8.0 [m/s] 10.0 [m/s] 12.0 [m/s]
50.0 dB(A) 50.0 dB(A) 50.0 dB(A)

Distance demand: 0.0 m

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DECIBEL - Assumptions for noise calculation

Noise calculation model: ISO 9613-2 General

NSA: Apartments-C

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand:

8.0 [m/s] 10.0 [m/s] 12.0 [m/s]
50.0 dB(A) 50.0 dB(A) 50.0 dB(A)

Distance demand: 0.0 m

NSA: Single Family-D

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand:

8.0 [m/s] 10.0 [m/s] 12.0 [m/s]
50.0 dB(A) 50.0 dB(A) 50.0 dB(A)

Distance demand: 0.0 m

NSA: Multi-Family-E

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand:

8.0 [m/s] 10.0 [m/s] 12.0 [m/s]
50.0 dB(A) 50.0 dB(A) 50.0 dB(A)

Distance demand: 0.0 m

NSA: SingleFamily-F

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand:

8.0 [m/s] 10.0 [m/s] 12.0 [m/s]
50.0 dB(A) 50.0 dB(A) 50.0 dB(A)

Distance demand: 0.0 m

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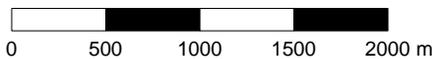
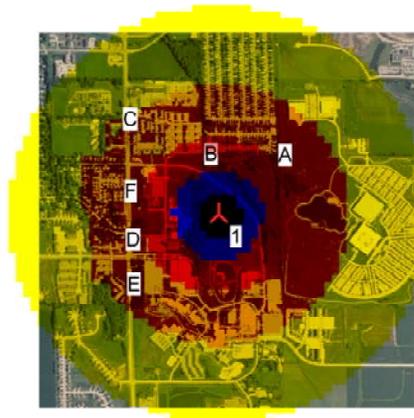
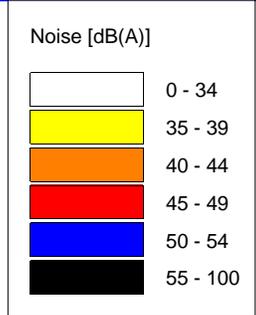
Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/14/2010 9:10 AM/2.7.473

DECIBEL - Map 8.0 m/s

Noise calculation model: ISO 9613-2 General



Map: , Print scale 1:40,000, Map center UTM NAD 83 Zone: 15 East: 611,880 North: 4,641,399
 Noise calculation model: ISO 9613-2 General. Wind speed: 8.0 m/s

 New WTG

 Noise sensitive area

Height above sea level from active line object

 35.0 dB(A)

 40.0 dB(A)

 45.0 dB(A)

 50.0 dB(A)

 55.0 dB(A)

Project:

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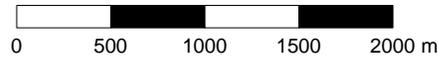
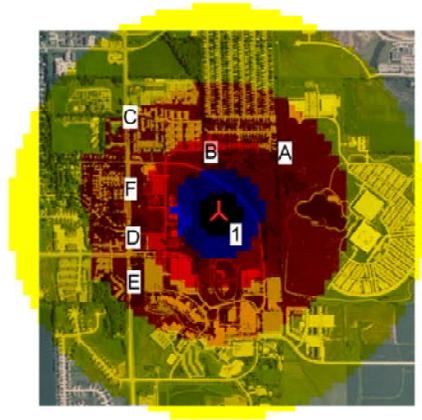
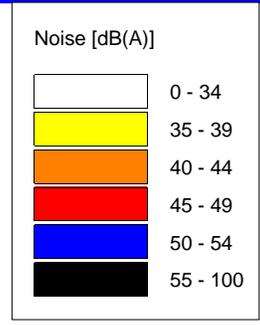
Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/14/2010 9:10 AM/2.7.473

DECIBEL - Map 10.0 m/s

Noise calculation model: ISO 9613-2 General



Map: , Print scale 1:40,000, Map center UTM NAD 83 Zone: 15 East: 611,880 North: 4,641,399
 Noise calculation model: ISO 9613-2 General. Wind speed: 10.0 m/s

-  New WTG
-  Noise sensitive area
-  35.0 dB(A)
-  40.0 dB(A)
-  45.0 dB(A)
-  50.0 dB(A)
-  55.0 dB(A)

Project:

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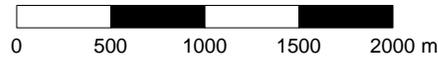
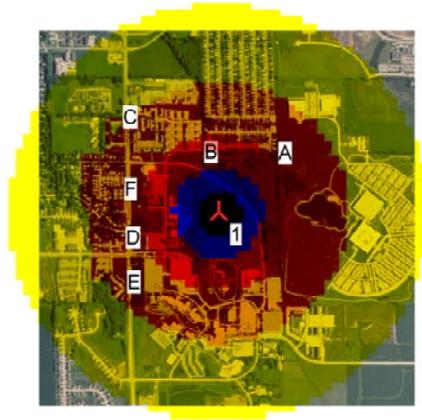
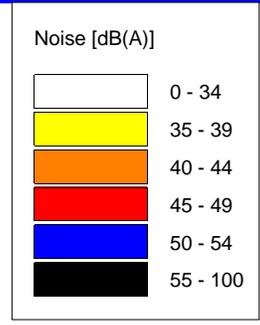
Ted McCaslin / tmccaslin@hrgreen.com

Calculated:

12/14/2010 9:10 AM/2.7.473

DECIBEL - Map 12.0 m/s

Noise calculation model: ISO 9613-2 General



Map: , Print scale 1:40,000, Map center UTM NAD 83 Zone: 15 East: 611,880 North: 4,641,399
 Noise calculation model: ISO 9613-2 General. Wind speed: 12.0 m/s

-  New WTG
 -  Noise sensitive area
 -  35.0 dB(A)
 -  40.0 dB(A)
 -  45.0 dB(A)
 -  50.0 dB(A)
 -  55.0 dB(A)
- Height above sea level from active line object

**VISUAL IMPACT ASSESSMENT
KIRKWOOD WIND ENERGY FACILITY**



July 2010

**Howard R. Green Company
Cedar Rapids, Iowa**

PROJECT DESCRIPTION

The proposed facility includes a single 2.5MW wind turbine. The proposed turbine and associated interconnect will be installed in early 2011. The total height of the turbine is 427 feet above ground level. The proposed turbine will be located on currently vacant land in the north half of the Kirkwood Community College Main Campus in Cedar Rapids, Iowa.

PROJECT VISIBILITY, APPEARANCE AND LANDSCAPE CONTEXT

The wind turbine will be highly visible. The proposed turbine will be a prominent feature in the landscape. Land use near the proposed turbine location includes institutional, commercial, office, residential and agricultural land uses. The turbine is surrounded to the north, east and west by large deciduous trees and baseball and softball fields to the south. The turbine will be one of the tallest features on the campus along with two approximately 400-foot-tall communication towers in the southwest part of the campus.

The turbine will be situated on the Kirkwood Community College campus and its presence will be consistent with the schools technical curriculum and renewable energy goals. It is anticipated that the single turbine will be a landmark for the campus and help orient people both on and off of the campus to locations in the area.

The turbine location is at the southern edge of Cedar Rapids. Much of the surrounding area is developed or partially developed. In addition to the two communication towers, two water towers, several cellular towers, billboards, and overhead utility towers are present within a mile of the proposed turbine. The proposed turbine will be prominent and be unique in shape and motion, but it will not be the only large vertical structure in the landscape.

SCENIC-RESOURCE VALUES AND SENSITIVITY LEVELS

The project area is experiencing some development from Cedar Rapids to the east, west and southwest. It is also located in the Iowa City/Cedar Rapids Tech Corridor. The turbine would be consistent with development in the tech corridor and help to anchor the college's visual location as development surrounds the campus at the south edge of the Cedar Rapids.

ASSESSMENT OF AESTHETIC IMPACTS

Google Earth was used with a 3-D plug-in from WindPro 2.7 software to show the proposed turbine in a number of landscape positions within and around the campus and assess positive and negative aesthetic impacts. See attached photos annotations detail from selected views.

MITIGATION TECHNIQUES

No mitigation for obstructed views or landscape setting disturbances is expected.

DETERMINATION OF ACCEPTABILITY OR UNDUE AESTHETIC IMPACTS

The proposed turbine site is located in a developed/developing area that is not known for its scenic or cultural significance. The turbine will not be visible from Palisades/Kapler State Park approximately 11 miles to the east or the Amana Colonies approximately 20 miles southeast; both nearby areas known for their scenic and cultural significance. The proposed turbine location in the City/Cedar Rapids Tech Corridor and within an educational facility make the turbine acceptable visual impact at its proposed location.



Community Training and Response Center. The nearest classroom building to the turbine.



View of turbine southwest edge of campus corner of Kirkwood Blvd SW and 76th Ave Drive SW



The north entrance to Kirkwood Community College. Turbine is prominent and not obstructed by trees. Trees near the main entrance to the south would obstruct the turbine from view.



View of the turbine from US Highway 30 west of Kirkwood Blvd.



Looking north, the turbine and Kirkwood Hall



Looking northwest, the turbine with Kirkwood Facilities building in forefront.

APPENDIX E

Microwave Assessment

Wind Power GeoPlanner™

Licensed Microwave Report

Kirkwood Community College Wind Energy Facility



Prepared on Behalf of
Howard R Green
Company

June 25, 2010



COMSEARCH
A CommScope Company



Table of Contents

1. Introduction	- 1 -
2. Summary of Results	- 2 -
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1. Introduction

The use of wind energy, one of the oldest forms of harnessing a natural energy source, is now one of the world's fastest growing alternative energy sources. The United States is committed to the use of wind energy, and over the next several years billions of dollars will be spent on wind power projects. However, as new wind turbine generators are installed around the country, it is important to note that they may pose an interference threat to existing microwave systems and broadcast stations licensed to operate in the United States.

Wind turbines can interfere with microwave paths by physically blocking the line-of-sight between two microwave transmitters. Additionally, wind turbines have the potential to cause blockage and reflections ("ghosting") to television reception. Blockage is caused by the physical presence of the turbines between the television station and the reception points. Ghosting is caused by multipath interference that occurs when a broadcast signal reflects off of a large reflective object—in this case a wind turbine—and arrives at a television receiver delayed in time from the signal that arrives via direct path.

Many states and other jurisdictions recognize the need for regulations addressing interference to radio signal transmissions from the wind turbine installations. Specifically, local planning authorities typically require project developers to ensure wind turbines will not cause interference. In some cases they require developers to notify the telecommunication operators in the area of the proposed wind turbine installation. Other factors prompting developers to undertake proactive investigation into potential interference include the need to prevent legal and regulatory problems and the desire to promote goodwill within the community—a good neighbor approach.

Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services.

This report focuses on the potential impact of wind turbines on licensed non-federal government microwave systems. Comsearch provides additional wind energy services, a description of which is available upon request.

2. Summary of Results

An overall summary of results appears below.

Project Information

Name: Kirkwood Community College Wind Energy Facility

County: Linn

State: Iowa

Total Microwave Paths	Paths with Obstructions	Total Turbines	Turbine Obstructions
5	0	1	0

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed paths from 0.9 - 23 GHz¹. First, we determined all microwave paths that intersect the area of interest². The area of interest was defined by the client and encompasses the planned turbine location. Next, for each microwave path that intersected the project area, we calculated a Worst Case Fresnel Zone (WCFZ). The mid-point of a full microwave path is the location where the widest (or worst case) Fresnel zone occurs. Fresnel zones were calculated for each path using the following formula.

$$R_n \cong 17.3 \sqrt{\frac{n}{F_{GHz}} \left(\frac{d_1 d_2}{d_1 + d_2} \right)}$$

Where,

- R_n = Fresnel Zone radius at a specific point in the microwave path, meters
- n = Fresnel Zone number, 1
- F_{GHz} = Frequency of microwave system, GHz
- d₁ = Distance from antenna 1 to a specific point in the microwave path, kilometers
- d₂ = Distance from antenna 2 to a specific point in the microwave path, kilometers

For worst case Fresnel zone calculations, d₁ = d₂

¹ Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

² We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.



The calculated WCFZ radius, giving the linear path an area or swath, buffers each microwave path in the project area. See the Tables and Figures section for a summary of paths and WCFZ distances. In general, this is the two-dimensional area where the planned wind turbines should be avoided, if possible. A depiction of the WCFZ overlaid on topographic basemaps can be found in the Tables and Figures section, and is also included on the enclosed CD³.

Discussion of Potential Obstructions

For this project, one turbine was considered in the analysis, with a blade diameter of 100 meters and turbine hub height of 80 meters.

The proposed turbine was not found to have a potential conflict with the incumbent microwave paths.

³ The ESRI® shapefiles contained on the enclosed CD are in NAD 83 UTM Zone 15 projected coordinate system.

3. Tables and Figures

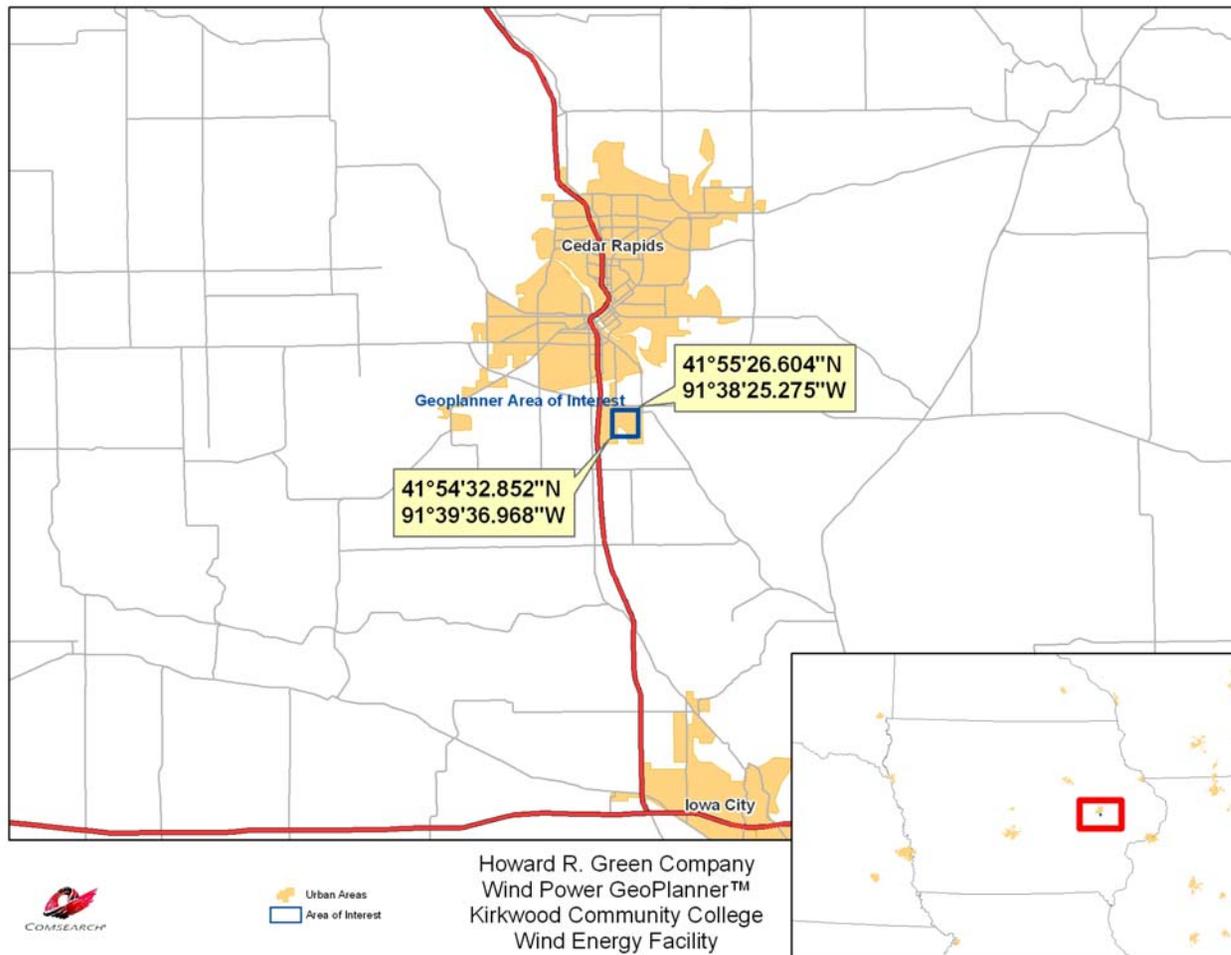


Figure 1: Area of Interest

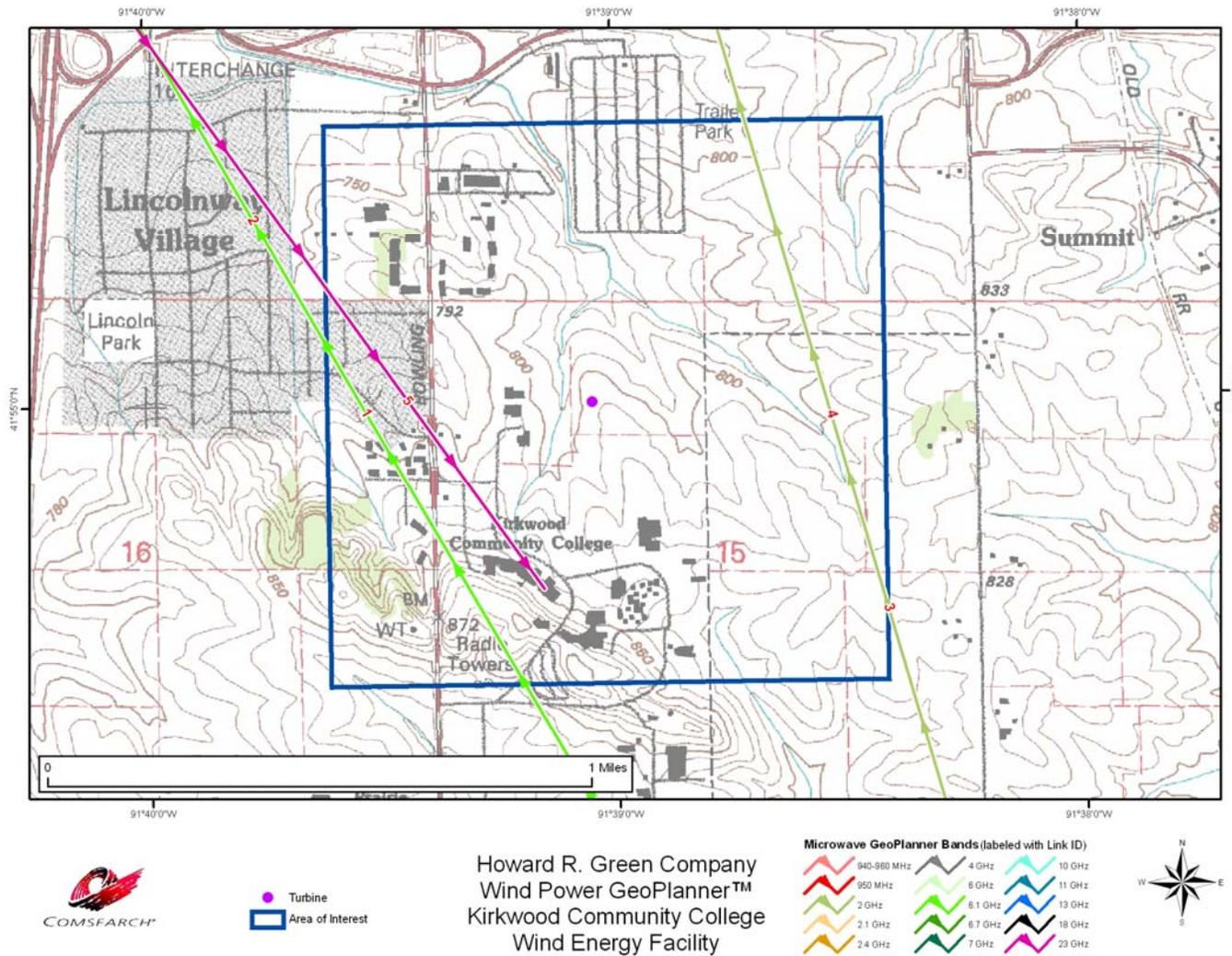


Figure 2: Microwave Paths that Intersect the Area of Interest

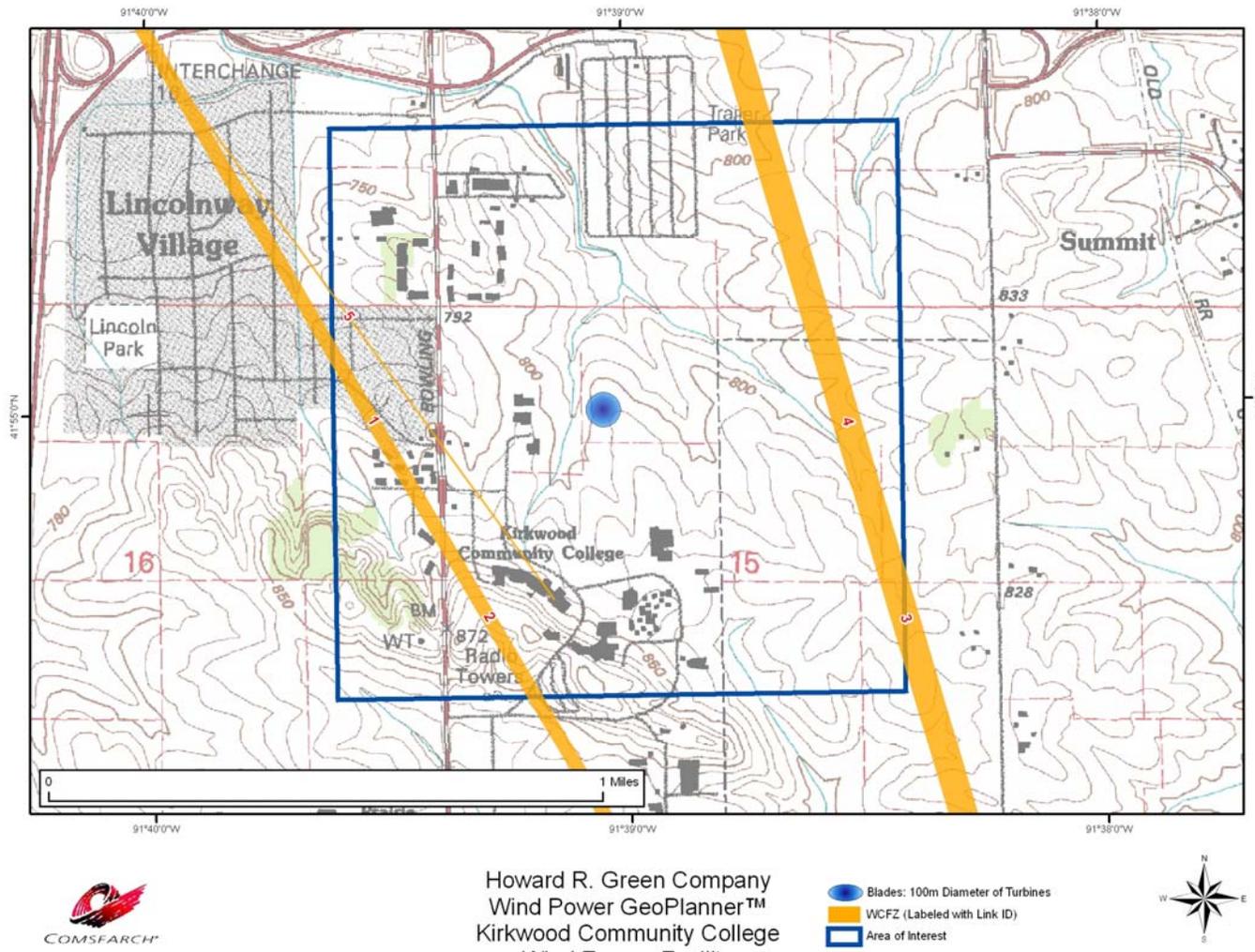


Figure 3: Microwave Paths with WCFZ Buffers



ID	Site Name 1	Site Name 2	Callsign 1	Callsign 2	Band	Licensee	WCFZ (m)
1, 2	IOWA CITY E	CEDAR RAPID	WMK527	WLT331	Lower 6 GHz	USCOC of Greater Iowa, Inc.	20.74
3, 4	IOWA CITY	HIAWATHA	WMU692	RXONLY	2 GHz	CEDAR RAPIDS TELEVISION COMPANY	40.70
5	SIXTH ST	KIRKWOOD CC	WNEP502	RXONLY	23 GHz	GRANTWOOD AREA EDUCATION	3.29

Table 1: Microwave Paths that Intersect the Area of Interest

*(See enclosed mw_geopl.xls for more information and
 GP_dict_matrix_description.xls for detailed field descriptions)*



4. Contact Us

For questions or information regarding the Licensed Microwave Report, contact:

Contact person:	Denise Finney
Title:	Account Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5650
Fax:	703-726-5595
Email:	dfinney@comsearch.com
Web site:	www.comsearch.com

APPENDIX F

Wetlands Assessment



July 2, 2010

U.S. Army Corps of Engineers, Rock Island
ATTN: Regulatory Branch
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Re: Kirkwood Community College Wind Energy Facility Consultation

Dear Regulatory:

Kirkwood Community College in Cedar Rapids, Iowa is proposing the construction of a single 2.5 megawatt wind turbine facility on the Kirkwood main campus. Kirkwood is a recipient of State Energy Program (SEP) grant from the Iowa Office of Energy Independence (OEI) and United States Department of Energy (DOE). Partial project funding for the proposed turbine is from this grant.

HR Green, on behalf of Kirkwood, is requesting a preliminary jurisdictional determination for potential impacts to waters of the United States within the project Area of Potential Effect (APE) identified on the attached Figures 1-3. USACE consultation is required as part of initial NEPA review for this project. The project facility will include the turbine tower footprint, transformer at the base of the tower, and access road from Tower Rd SW adjacent to the proposed turbine site.

Wetland Observations

A review of the USGS quad map Cedar Rapids South shows the project area is adjacent to an unnamed perennial stream that is a tributary of Prairie Creek. Elevations within the APE appear between 790 and 810 feet. The project area is within the Upper Mississippi-Iowa-Skunk-Wapsipinicon HUC8 watershed (#07080205).

Mapped soils within the APE include a sliver 0.02 acre of hydric soil and 4.48 acres of non-hydric soils. A PEMA (Palustrine, Emergent, Temporary Flooded) NWI polygon appears approximately 100 feet west of the APE. See Figure 2 for more detail.

HR Green Project Scientist Ted McCaslin visited the project site on June 12, 2010. No indications of inundation, saturation or hydrophytic vegetation were observed within the APE. Species observed within the project area include: Kentucky bluegrass (*Poa praetensis*), fescue (*Festuca spp.*), dandelion (*Taraxacum officianale*), white clover (*Trifolium repens*), common plantain (*Plantago major*) and crabgrass (*Digitaria spp.*). The project area appears to be in row crops in a 1960s aerial photograph (See Figure 3).

progress. innovation. expertise.

The adjacent stream shown on the USGS quad and the NWI polygon areas in Figures 1 & 2 were investigated for wetland indicators. A sand/silt substrate, narrow (3-5 feet wide) stream was observed at the mapped stream location and mature trees appear to have grown next to the stream adjacent to the project area. The PEMA NWI polygon appeared completely forested during the site visit.

Observed tree species included eastern cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), boxelder (*Acer negundo*), white mulberry (*Morus alba*), black cherry (*Prunus serotina*), and black willow (*Salix nigra*). Forested wetlands may be present in this forest area. The forested areas are completely outside of the project APE.

Conclusions

No wetland indicators were observed within the APE during a preliminary review and site visit. A perennial stream and forested wetlands adjacent to the stream appear to the west of the APE.

Please call me at 651-659-7708 or email tmccaslin@hrgreen.com if you have questions.

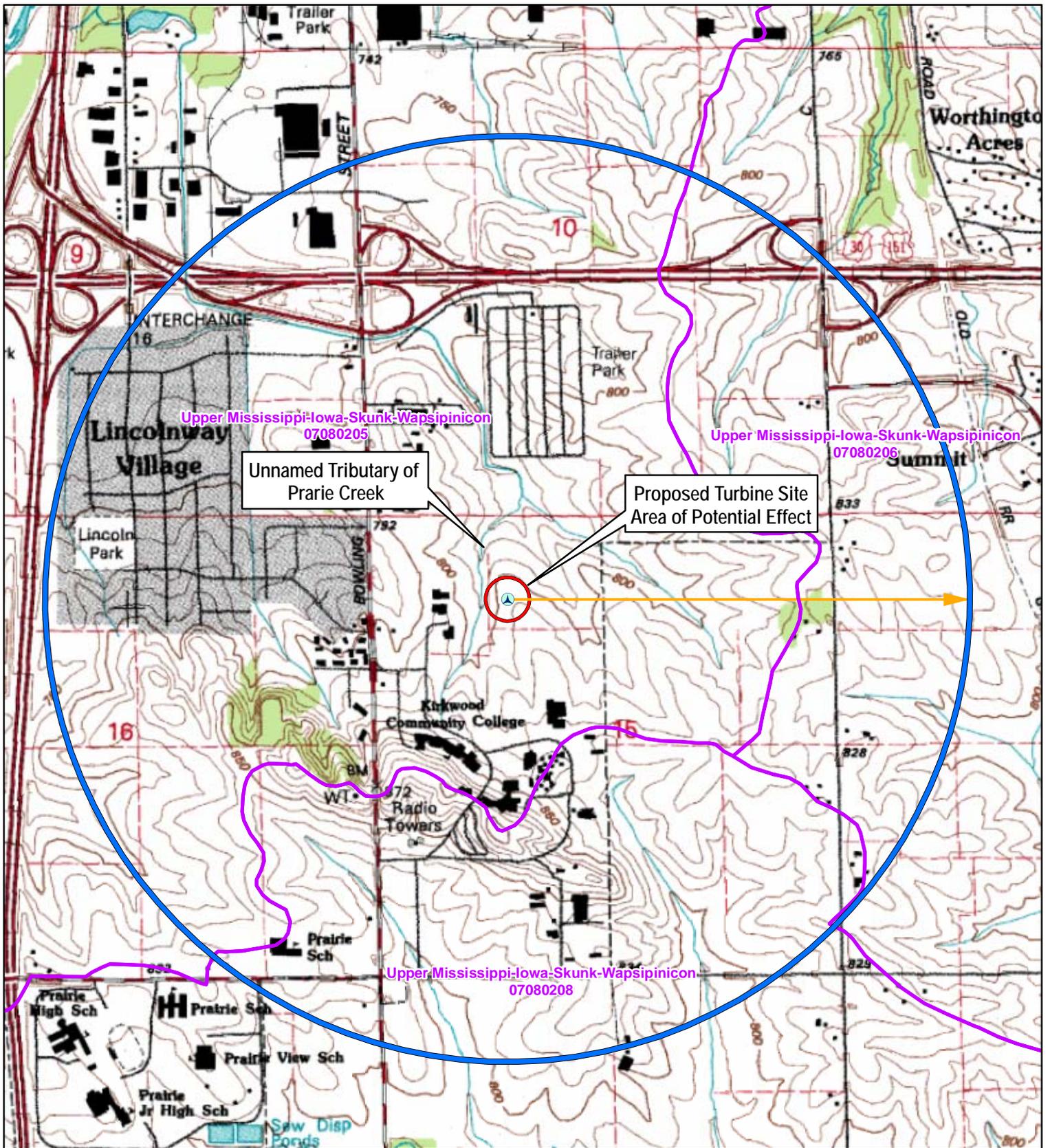
Sincerely,
HOWARD R. GREEN COMPANY



Ted McCaslin
Project Scientist

Enclosures

Figure 1 – USGS 1:24,000 Quadrangle Map of Project Area
Figure 2 – Site Map with NWI & Soils Data
Figure 3 – 1960s Aerial Photography
Site Photos



- Area of Potential Effect (APE)
- 1-Mile Buffer of APE
- HUC8 Watersheds
- ⊙ Proposed Turbine Location
- ➔ 1-Mile Radius of Project Site

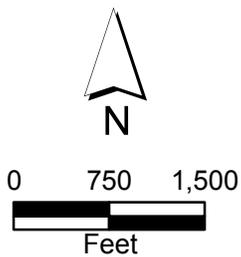
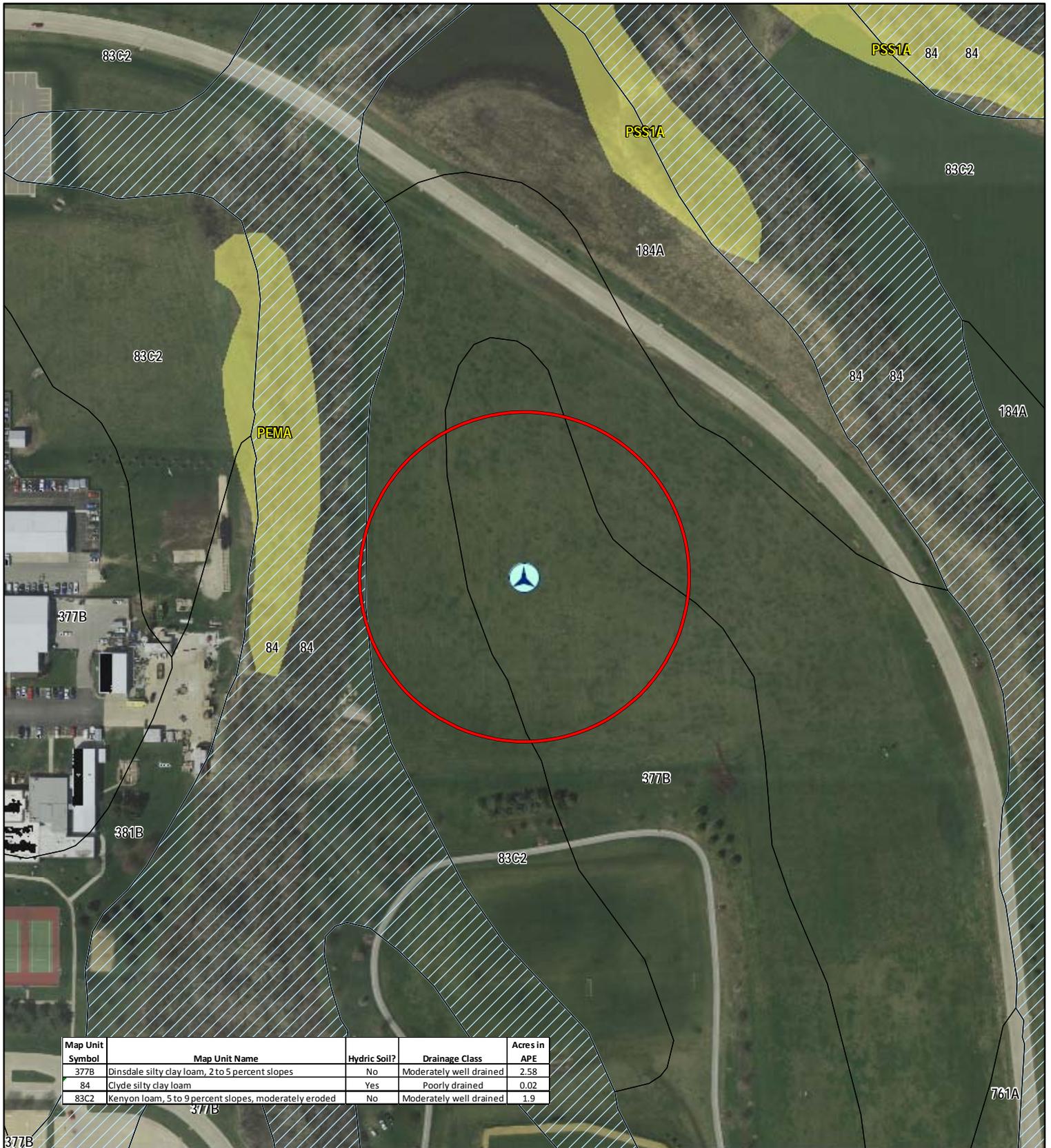


FIGURE 1
LOCATION MAP

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

Source: USDA, NRCS
Digital Raster Graphic Mosaic of Linn County, Iowa
USGS 7.5' Quad Mosaic for Linn County, 2002



Map Unit Symbol	Map Unit Name	Hydric Soil?	Drainage Class	Acres in APE
377B	Dinsdale silty clay loam, 2 to 5 percent slopes	No	Moderately well drained	2.58
84	Clyde silty clay loam	Yes	Poorly drained	0.02
83C2	Kenyon loam, 5 to 9 percent slopes, moderately eroded	No	Moderately well drained	1.9

-  Area of Potential Effect (APE)
-  Linn County SSURGO
-  Hydric Soils
-  National Wetlands Inventory
-  Proposed Turbine Location

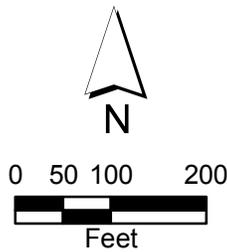


FIGURE 2
Soils and NWI

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa



Sources: USDA SSURGO for Linn County; IowaDNR NR-GIS



-  Area of Potential Effect (APE)
-  Approximate Forest Location 2010
-  Proposed Turbine Location

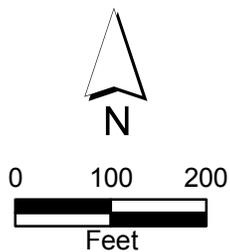
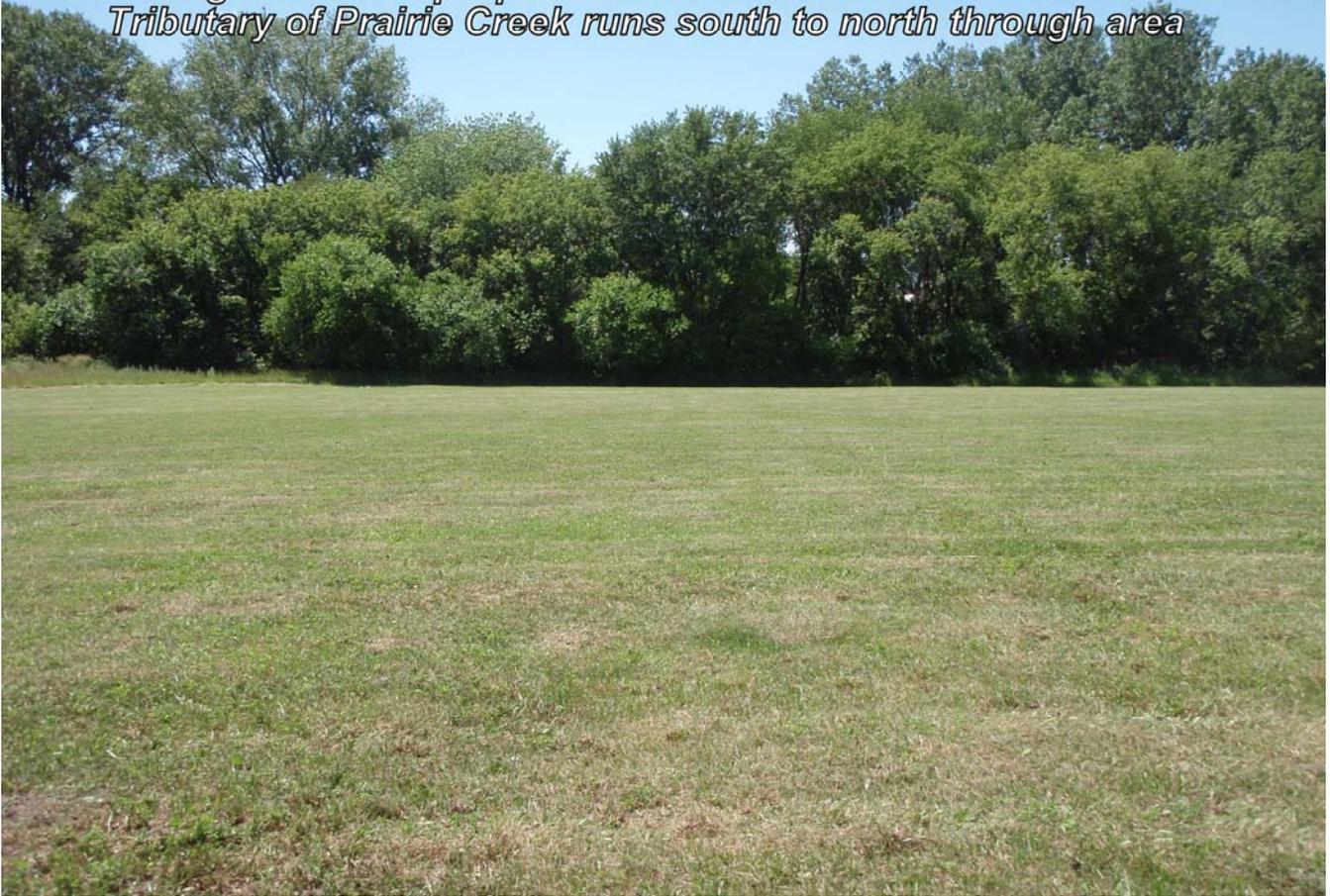


FIGURE 3
1960s Aerial Photography

Proposed Wind Facility
Kirkwood Community College
Cedar Rapids, Iowa

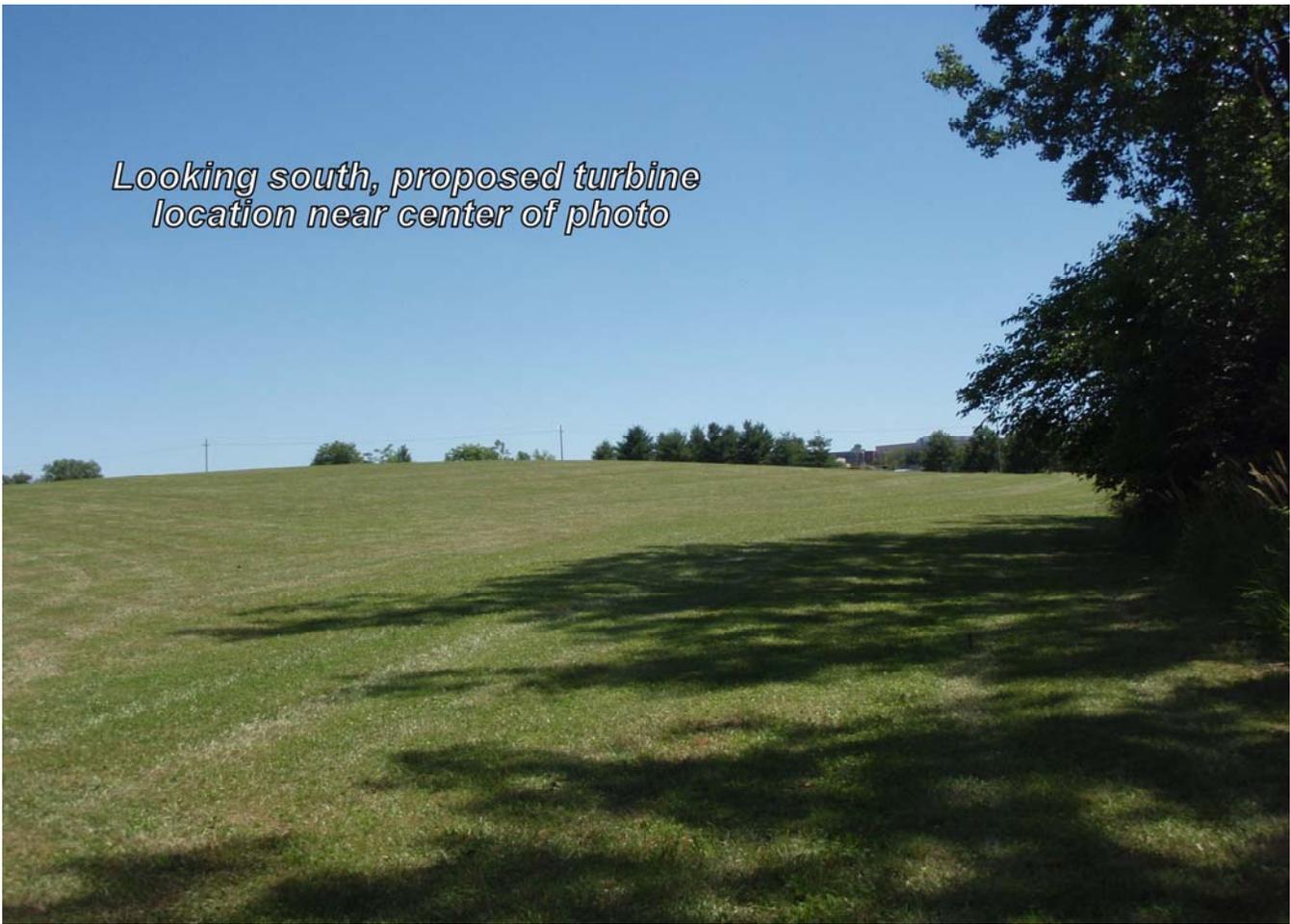
Source: Iowa USDA Orthos 1960s

*Looking west from proposed turbine location at forested area
Tributary of Prairie Creek runs south to north through area*



Looking east, proposed turbine location near center of photo





Looking south, proposed turbine location near center of photo



Looking north, forested area west of proposed turbine at left. Maintained vacant area at right of photo

Looking south from road, forested stream north of project area



*Small stream in forested area
No impacts to stream Proposed*





REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING - P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

JUL 19 2010

July 14, 2010

Operations Division

SUBJECT: CEMVR-OD-P-2010-816

Mr. Ted McCaslin
HR Green Company
Court International Building
2550 University Avenue W, Suite 400 N
St. Paul, Minnesota 55114

Dear Mr. McCaslin:

Our office reviewed your letter July 2, 2010, concerning the proposed construction of a single 2.5 megawatt wind turbine facility on the Kirkwood Community College Main Campus in Section 15, Township 82 North, Range 7 West, Linn County, Iowa.

We determined your project (wind turbine location only) as proposed does not require a Department of the Army (DA) Section 404 permit. The decision regarding this action is based on information found in the administrative record which documents the District's decision-making process, the basis for the decision, and the final decision. No indication of discharge of dredged or fill material was found to occur in waters of the United States (including wetlands). Therefore, this determination resulted.

You have also indicated that an access road will be built on the site. If this road will impact wetlands, a permit may be required. If it will not impact wetlands, then no permit will be required for the road.

This letter contains an approved jurisdictional determination for the subject site. If you object to this jurisdictional determination, you may request an administrative appeal under Corps regulations found at 33 CFR Part 331. Enclosed is a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this approved jurisdictional determination, you must submit a completed RFA form to the Mississippi Valley Division Office at the following address:

Mr. James B. Wiseman, Jr.
Administrative Appeals Review Officer
Mississippi Valley Division
P.O. Box 80 (1400 Walnut Street)
Vicksburg, MS 39181-0080

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by September 13, 2010.

It is not necessary to submit an RFA form to the Division Office if you do not object to the approved jurisdictional determination contained in this letter.

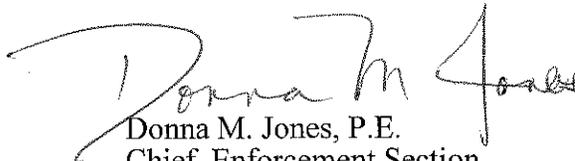
You are advised that this determination for your project is valid for five years from the date of this letter. If the project is not completed within this five-year period or your project plans change, you should contact our office for another determination.

Although a DA permit will not be required for the project, this does not eliminate the requirement that you must still acquire other applicable Federal, state, and local permits.

The Rock Island District Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, please take a moment to complete the attached postcard and return it or go to our Customer Service Survey found on our web site at <http://per2.nwp.usace.army.mil/survey.html>. (Be sure to select "Rock Island District" under the area entitled: Which Corps office did you deal with?).

Should you have any questions, please contact our Regulatory Branch by letter, or telephone Mr. Albert Frohlich at 309/794-5859.

Sincerely,

A handwritten signature in cursive script that reads "Donna M. Jones". The signature is written in black ink and is positioned above the typed name and title.

Donna M. Jones, P.E.
Chief, Enforcement Section
Regulatory Branch

Enclosures

Copies Furnished: (w/o enclosures)

Ms. Chris Schwake (3)
Iowa Department of Natural Resources
Water Resources Section
Wallace State Office Building
502 East 9th Street
Des Moines, Iowa 50319-0034

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Kirkwood Community College	File Number: 2010-816	7/14/2010
Attached is:		See Section below
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input checked="" type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:

Name Albert J. Frohlich
US Army Corps of Engineers District, Rock Island
ATTN: Regulatory Branch
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Telephone: 309/794-5859

If you only have questions regarding the appeal process you may also contact:

James B. Wiseman, Jr.
Administrative Appeals Review Officer
Mississippi Valley Division
P.O. Box 80 (1400 Walnut Street)
Vicksburg, MS 39181-0080

Telephone: (601) 634-5820

Fax: (601) 634-5816 (fax)

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.

Date:

Telephone number:

APPROVED JURISDICTIONAL DETERMINATION FORM

U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 7/14/2010

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: ROCK ISLAND, CEMVR-OD-P-2010-816

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: Iowa

County/parish/borough: Linn City:

Center coordinates of site (lat/long in degree decimal format): Lat. ° Pick List, Long. ° Pick List

Universal Transverse Mercator: N 4641328 E 611785

Name of nearest waterbody: Prairie Creek

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Iowa River

Name of watershed or Hydrologic Unit Code (HUC): 7080205

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: 7/14/2010

Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There Are no "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There Are no "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.

a. Indicate presence of waters of U.S. in review area (check all that apply):¹

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters² (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

b. Identify (estimate) size of waters of the U.S. in the review area:

Non-wetland waters: linear feet: width (ft) and/or acres.

Wetlands: acres.

c. Limits (boundaries) of jurisdiction based on: Pick List

Elevation of established OHWM (if known):

2. Non-regulated waters/wetlands (check if applicable):³

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.

Explain:

¹ Boxes checked below shall be supported by completing the appropriate sections in Section III below.

² For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

³ Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW

Identify TNW:

Summarize rationale supporting determination:

2. Wetland adjacent to TNW

Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody⁴ is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **Pick List**

Drainage area: **Pick List**

Average annual rainfall: inches

Average annual snowfall: inches

(ii) Physical Characteristics:

(a) Relationship with TNW:

Tributary flows directly into TNW.

Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.

Project waters are **Pick List** river miles from RPW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Project waters are **Pick List** aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain:

Identify flow route to TNW⁵:

Tributary stream order, if known:

⁴ Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

⁵ Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

- Tributary is:** Natural
 Artificial (man-made). Explain:
 Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):

Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

- | | | |
|--|--|-----------------------------------|
| <input type="checkbox"/> Silts | <input type="checkbox"/> Sands | <input type="checkbox"/> Concrete |
| <input type="checkbox"/> Cobbles | <input type="checkbox"/> Gravel | <input type="checkbox"/> Muck |
| <input type="checkbox"/> Bedrock | <input type="checkbox"/> Vegetation. Type/% cover: | |
| <input type="checkbox"/> Other. Explain: | | |

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:

Presence of run/riffle/pool complexes. Explain:

Tributary geometry: **Pick List**

Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**

Estimate average number of flow events in review area/year: **Pick List**

Describe flow regime:

Other information on duration and volume:

Surface flow is: **Pick List.** Characteristics:

Subsurface flow: **Pick List.** Explain findings:

- Dye (or other) test performed:

Tributary has (check all that apply):

- | | | |
|---|---|--|
| <input type="checkbox"/> Bed and banks | | |
| <input type="checkbox"/> OHWM ⁶ (check all indicators that apply): | | |
| <input type="checkbox"/> clear, natural line impressed on the bank | <input type="checkbox"/> the presence of litter and debris | |
| <input type="checkbox"/> changes in the character of soil | <input type="checkbox"/> destruction of terrestrial vegetation | |
| <input type="checkbox"/> shelving | <input type="checkbox"/> the presence of wrack line | |
| <input type="checkbox"/> vegetation matted down, bent, or absent | <input type="checkbox"/> sediment sorting | |
| <input type="checkbox"/> leaf litter disturbed or washed away | <input type="checkbox"/> scour | |
| <input type="checkbox"/> sediment deposition | <input type="checkbox"/> multiple observed or predicted flow events | |
| <input type="checkbox"/> water staining | <input type="checkbox"/> abrupt change in plant community | |
| <input type="checkbox"/> other (list): | | |
| <input type="checkbox"/> Discontinuous OHWM. ⁷ Explain: | | |

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

- | | |
|--|--|
| <input checked="" type="checkbox"/> High Tide Line indicated by: | <input checked="" type="checkbox"/> Mean High Water Mark indicated by: |
| <input type="checkbox"/> oil or scum line along shore objects | <input type="checkbox"/> survey to available datum; |
| <input type="checkbox"/> fine shell or debris deposits (foreshore) | <input type="checkbox"/> physical markings; |
| <input type="checkbox"/> physical markings/characteristics | <input type="checkbox"/> vegetation lines/changes in vegetation types. |
| <input type="checkbox"/> tidal gauges | |
| <input type="checkbox"/> other (list): | |

(iii) **Chemical Characteristics:**

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain:

Identify specific pollutants, if known:

⁶A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

⁷Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width):
- Wetland fringe. Characteristics:
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain:

Wetland quality. Explain:

Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain:

Surface flow is: **Pick List**

Characteristics:

Subsurface flow: **Pick List**. Explain findings:

- Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:

- Directly abutting
- Not directly abutting
 - Discrete wetland hydrologic connection. Explain:
 - Ecological connection. Explain:
 - Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List**.

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain:

Identify specific pollutants, if known:

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width):
- Vegetation type/percent cover. Explain:
- Habitat for:
 - Federally Listed species. Explain findings:
 - Fish/spawn areas. Explain findings:
 - Other environmentally-sensitive species. Explain findings:
 - Aquatic/wildlife diversity. Explain findings:

3. **Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately () acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N) Size (in acres) Directly abuts? (Y/N) Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
 TNWs: linear feet width (ft), Or, acres.
 Wetlands adjacent to TNWs: acres.
2. **RPWs that flow directly or indirectly into TNWs.**
 Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial:
 Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters:

3. Non-RPWs⁸ that flow directly or indirectly into TNWs.

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
 Other non-wetland waters: acres.
Identify type(s) of waters:

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
 Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:
 Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.⁹

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from "waters of the U.S.," or
 Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
 Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):¹⁰

- which are or could be used by interstate or foreign travelers for recreational or other purposes.
 from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
 which are or could be used for industrial purposes by industries in interstate commerce.
 Interstate isolated waters. Explain:
 Other factors. Explain:

Identify water body and summarize rationale supporting determination:

⁸See Footnote # 3.

⁹To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

¹⁰Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
- Identify type(s) of waters: .
- Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
 - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps:
- Corps navigable waters' study:
- U.S. Geological Survey Hydrologic Atlas:
 - USGS NHD data.
 - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: 24K, Cedar Rapids South, IA.
- USDA Natural Resources Conservation Service Soil Survey. Citation:
- National wetlands inventory map(s). Cite name: Cedar Rapids South, IA.
- State/Local wetland inventory map(s): .
- FEMA/FIRM maps:
- 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): .
or Other (Name & Date): .
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law:
- Applicable/supporting scientific literature:
- Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: There are no wetlands within the mapped project site. HR Green submitted documentation to support these findings in a preliminary on-site review.