Sunflower Wind Project

DRAFT Environmental Assessment

DOE/EA 1966

Western
AREA POWER
ADMINISTRATION

U.S. Department of Energy
Western Area Power Administration

May 2014

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Acronyms and Abbreviations

ABPP	Avian and Bat Protection Plan
BBS	North American Breeding Bird Survey
BMP	Best Management Practices
CAA	Federal Clean Air Act
CRP	Conservation Reserve Program
CWA	Clean Water Act
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
EPC	engineering, procurement, and construction
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
DOE	U.S. Department of Energy (DOE)
MAPP	Mid-Continent Area Power Pool
MBTA	Migratory Bird Treaty Act
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDDoH	North Dakota Department of Health
NDGFD	North Dakota Game and Fish Department
NDGS	North Dakota Geographic Survey
NEPA	National Environmental Policy Act
NHD	National Hydrologic Data
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NWP	Nationwide Permit

O&M	Operations and Maintenance
Tariff	Open Access Transmission Service Tariff
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geographic Survey
Western	Western Area Power Administration
WMD	Wetland Management Districts
WMA	Wildlife Management Areas

1.0 INTRODUCTION

Sunflower Wind Project, LLC (Sunflower) proposes to develop the Sunflower Wind Project (Project), to be located on privately owned land in Stark and Morton Counties, North Dakota, (Figure 1). The Project would interconnect to the U.S. Department of Energy (DOE) Western Area Power Administration (Western)'s Dickinson-Mandan 230 kilovolt (kV) transmission line, which crosses the Project Area. Interconnection would be at a new switchyard to be constructed by Western and located within the Project Area. Sunflower's interconnection agreement with Western is a federal action requiring review under the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et. seq. Western has prepared this Environmental Assessment (EA) to comply with NEPA and its implementing regulations.

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

Under NEPA, the purpose and need for a proposed action help define the range of alternatives considered. Only "reasonable" alternatives need be considered (40 CFR 1502.14(A)), and reasonable alternatives must accomplish the underlying purpose and need of the applicant or the public that would be satisfied by the proposed federal action (33 CFR Ch. II, NEPA Deskbook p 138). Consequently, it is important to understand the purpose and need for the Project from the perspective of both the applicant and Western as the NEPA lead agency.

2.1 Applicant's Purpose and Need

Sunflower's purpose is to provide an economically viable, reliable and cost-effective source of renewable energy to users in North Dakota and throughout Western's service area. To accomplish this purpose, the Project must be technically, environmentally and economically feasible. To that end, Sunflower needs for the following factors to be present:

- A reliable wind resource capable of producing enough power for the Project to be economically viable,
- Landowners willing to participate in the Project,
- Environmental conditions which allow the Project to comply with applicable environmental regulation at a reasonable cost,
- An interconnection agreement with Western to transmit power to a power purchaser, and
- A power purchase agreement for a duration and at a price which permits the Project to be economically viable.

2.2 Western's Purpose and Need

Sunflower, as an Interconnection Customer, requests to interconnect its proposed Project with Western's Dickinson-Mandan 230 kV transmission line at a new interconnection switchyard to be constructed by Sunflower within the Project Area. Western's purpose and need is to consider and respond to the interconnection request in accordance with its Open Access Transmission

Service Tariff (Tariff) and the Federal Power Act. Western's Tariff is filed with the Federal Energy Regulatory Commission (FERC) for approval.

Under the Tariff, Western offers capacity on its transmission system to deliver electricity when capacity is available. The Tariff also contains terms for processing requests for the interconnection of generation facilities to Western's transmission system. In reviewing interconnection requests, Western must ensure that existing reliability and service is not degraded. Western's Tariff provides for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies also identify system upgrades or additions necessary to accommodate the proposed project and address whether the upgrades/additions are within the project scope.

2.3 Alternatives Considered

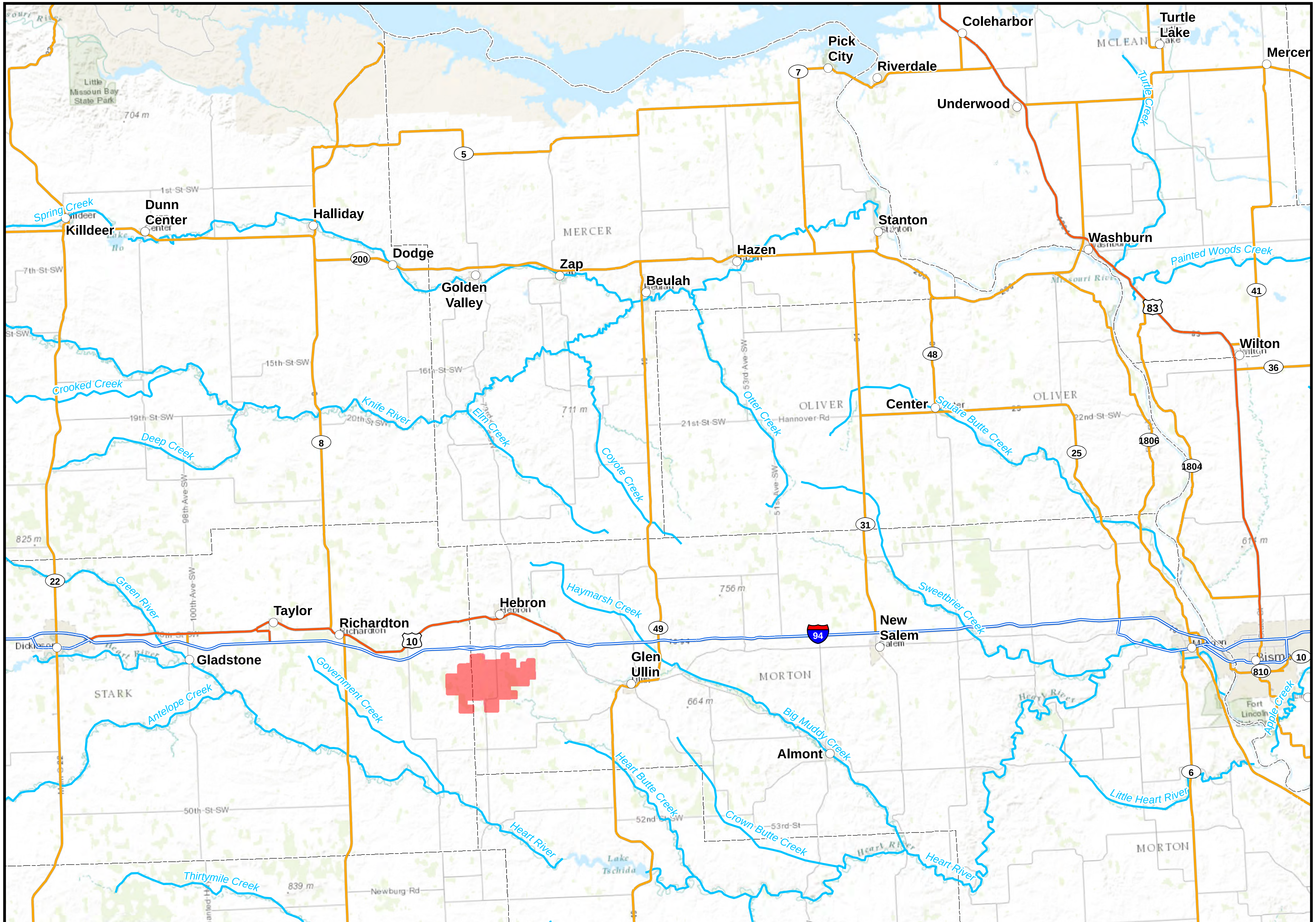
This EA discusses two alternatives, the Proposed Action Alternative and the No-Action Alternative. The Proposed Action would be a 110 MW wind energy facility with a 438,000 MWh annual production cap, which is the upper limit of what Western presently analyzes under an EA to comply with their NEPA obligations.

Under the No Action Alternative, no wind energy facility would be constructed. These alternatives are described in greater detail in Section 3.

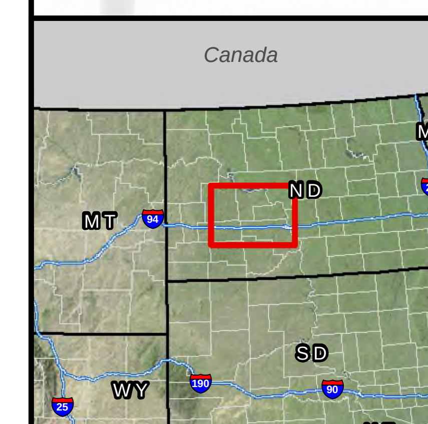
Sunflower Wind Project Environmental Assessment

Figure 1
Project Location

Morton and Stark Counties, ND
April 2014



Project Area
County Boundary
Existing Transmission Line (Over 230 kV)
Railroad
Interstate Highway
Federal Highway
State Highway
Stream or River
City/Town



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2.4 Required Permits and Approvals

The Project is likely to require the permits and approvals identified in Table 1. The permit requirements will depend on final Project design, and may include additional permits not shown in Table 1.

Table 1. Permits Potentially Required

Regulatory Authority	Legal Authority	Permit/Approval	Description	Trigger	Application Time	Website
Federal						
FERC	18 CFR 366.7	Exempt Wholesale Generator Status	Request for a determination that the utility is a wholesale generator of electric power and thus exempt from most FERC regulations that pertain to a public utility	Request by entity generating electric power for wholesale customers		
FERC	18 CFR Part 35	Market Based Rate Authorization	An entity seeking to make market-based rate sales of energy, capacity and ancillary services in the wholesale markets must first seek authorization from FERC	Request by entity generating wholesale electricity		
FAA	14 CFR Part 77	Notice of Proposed Construction or Alteration (Form 7460-1)	Notifies FAA of proposed structures that might affect navigable airspace. FAA reviews possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.	• Construction or alteration of structures standing higher than 200 feet above ground level • Construction or alteration of structures near airports; 14 CFR 77.13 provides details • Siting within radar line-of-sight of an air defense facility	45 days	

Regulatory Authority	Legal Authority	Permit/Approval	Description	Trigger	Application Time	Website
FAA	14 CFR Part 77	Supplemental Notice (Form 7460-2)	Supplemental Notice provided to FAA in advance of beginning construction	Planned start of construction on project for which a Notice of Proposed Construction was required	5 days	
USACE	Clean Water Act (33 USC 1251 et seq) Section 404 (33 USC 1344)	CWA Section 404 Permit; individual, general or nationwide permit	Regulates discharge of dredged or fill materials into waters of the United States	Activities that may impact federal waters, including wetlands	45 days	
USFWS Region 6	ESA Section 7 16 USC 1536(a)(2)	Consultation pursuant to ESA Section 7.	Federal activities and non-Federal activities that receive Federal funding or require a Federal permit typically obtain incidental take authority through the consultation process under Section 7 of the ESA.	Federal action and the presence of listed species in or near the project area.	Prior to ground disturbing activities. Depending on project size and potential impacts to listed species – 1 to 6 months.	http://www.fws.gov/endangered/hcp/hcpbook.htm http://www.fws.gov/mount ain-prairie/endspp/
EPA	Clean Water Act Section 311, 40 CFR 112	Spill Prevention Control and Countermeasures (SPCC) Plan.	Required if any facility associated with the project (O&M or substation) has a tank holding more than 1,320 gallons.	Oil storage of more than 1,320 gallons of oil.	A copy of the plan will need to be maintained on file with the owner/operator and reviewed by the certifying engineer every five years.	
North Dakota Public Service Commission	Pursuant to North Dakota Century Code 49-22	Certificate of Site Compatibility.	For facilities with greater than 0.5 MW nameplate capacity.	Generation of power described in previous column.	180 days prior to construction (minimum).	http://www.psc.state.nd.us/jurisdiction/electricity- laws.html

Regulatory Authority	Legal Authority	Permit/Approval	Description	Trigger	Application Time	Website
North Dakota Department of Health	Clean Water Act 33 USC 1342 NDAC 33-16-01	NPDES General Permit (Construction).	For stormwater discharges from construction activities.	Grading of more than 1 acre.	Permit to be filed prior to construction with a Stormwater Pollution Prevention Plan (SWPPP).	http://www.ndhealth.gov/WQ/Storm/Construction/ConstructionHome.htm
	NDAC 33-16-01	Septic Tank and Drainfield Permit.	Required for installation of septic system at O&M facility.	Installation of a septic system.	Prior to construction.	
North Dakota Highway Patrol		Overheight/ Overweight Permit.	Required to transport oversize loads on state maintained roads.	Project construction requires oversize/ overweight truck loads.	Prior to construction.	http://www.nd.gov/ndhp/permits/permits.html
State Historic Preservation Office (SHPO) and the Office of the State Archaeologist (OSA)	North Dakota Century Code 55-10; 49-22 And NHPA Section 106, 16 USC 470	Review and Coordination.	Section 106 Compliance is required if there is a federal permit or approval.	Interconnection request to Western.	Prior to construction.	
North Dakota Department of Game and Fish		Wildlife conservation recommend-ations.	Consultation will be required as part of by North Dakota PSC review of the Certificate of Site Compatibility.	Certificate of Site Compatibility Review by ND PSC.		
North Dakota State Water Commission	NDAC 889-03-01-10	Temporary Water Permit.	Required for temporary use of surface or groundwater.	Construction water used onsite.	Prior to construction; permit is valid for up to one year	http://www.swc.state.nd.us/4dlink9/4dcgi/GetSubCategoryRecord/Permits/Water%20Permits

Regulatory Authority	Legal Authority	Permit/Approval	Description	Trigger	Application Time	Website
Stark and Morton Counties	County Regulations (Morton and Stark)	Conditional Use Permit.	All proposed wind energy facilities in an agricultural zone must apply for a conditional use permit with County Planning Commission.	Wind energy facility in agricultural zone.	Prior to construction. Process takes about 3 months.	
	County Regulations-Morton Only	Wind Energy Facilities Permit.	Construction requirements (materials used, proximity to buildings, etc).	Wind development.	Prior to construction.	http://www.co.morton.nd.us/ vertical/Sites/%7B 90CBB59C -38EA-4D41- 861A-81C9D E BD6022%7D/uploads/%7B5 A74CC6D-8D37- 4C41-B6 76- 1AE4A6040CDB% 7D. PDF
	County Regulations (Morton and Stark)	Road Crossing/ Encroachment Permit.	Required for installation of service connections or extensions of existing underground utilities including crossing of county highways or for placing temporary obstructions on the right-of-way.	Working in or utility crossing of county road right-of-way.	Prior to construction.	
	County Regulations (Morton and Stark)	Building Permit.	Required if O&M building is constructed.	O&M Building.	Prior to construction.	

2.5 Public Participation

Western consulted with the federal, state and local agencies listed in Section 5 of this document in the development of this EA, in compliance with NEPA rules (Council on Environmental Quality [CEQ] NEPA Regulations, 40 CFR 1501.4(b). Western will consider comments on this Draft EA from agencies, tribes, landowners, and other interested parties in determining whether to issue a Finding of No Significant Impact (FONSI).

A public scoping meeting was held at the Hampton Inn and Suites in Dickinson, North Dakota on August 22, 2013, and a public open house meeting was held December 3, 2013 in Hebron, North Dakota at the Hebron Community Center.

A summary of these public meetings is included in Appendix A. The written comments received from agencies and the public during the scoping period and at the open house are included in Appendix B.

2.6 Reference to the Upper Great Plains Wind Energy Programmatic EIS

In March 2013 Western and the USFWS released the Draft Upper Great Plains Wind Energy Programmatic EIS (UGP Wind Energy PEIS; Western and USFWS 2013). The UGP Wind Energy PEIS is intended to address the majority of the environmental impacts that occur when wind energy projects are constructed, operated, maintained, and decommissioned in Western's Upper Great Plains Customer Service Region (UGP Region), which encompasses all or parts of the states of Iowa, Minnesota, Montana, Nebraska, North Dakota, and South Dakota. Based on Western's experience with existing projects, the PEIS identifies the range of potential environmental impacts expected for wind energy projects, and identifies Best Management Practices (BMPs) and mitigation measures that have been found to be effective in avoiding or reducing impacts on specific environmental resources, and that could be applied to satisfactorily eliminate, minimize, or reduce the environmental impacts for many wind energy projects.

As stated in the Executive Summary of the UGP Wind Energy PEIS, it is Western's intent that future wind energy project environmental analysis would tier off of the analyses and decisions embedded in the PEIS, and that additional project-specific NEPA analyses would refer back to the PEIS for relevant information, allowing subsequent NEPA documents to focus on site-specific issues and concerns. Both Western and the USFWS would continue to require site-specific NEPA evaluations for projects (including analysis of cumulative impacts), but those NEPA evaluations would tier off the analyses in the PEIS as long as the project developers are willing to implement the applicable evaluation process, BMPs, and mitigation measures identified in the PEIS and Record of Decision (ROD). The environmental procedures and mitigation strategies identified in the PEIS would be applied to interconnection requests made to Western by project developers and to requests for consideration of easement exchanges to accommodate wind energy project development on grassland and wetland easements managed by the USFWS within the UGP Region.

The Draft UGP Wind Energy PEIS includes practicable measures for avoiding or reducing environmental impacts, but recognizes that some measures may not be appropriate or effective in all situations. Consequently, the PEIS notes that Western and the USFWS would coordinate with project developers during project planning activities to identify the project-specific measures that would be applicable to each project.

This EA cannot tier from the UGP Wind Energy PEIS, since that document was in draft form and had not been adopted at the time of submittal of this EA. However, the Draft PEIS contains BMPs and avoidance and minimization measures which have been reviewed by Western, the USFWS and appropriate agencies, and which are unlikely to change substantially with adoption of the Final EIS and ROD. Sunflower has incorporated the BMPs and minimization measures identified in the Draft PEIS that are applicable to the Project, and will implement these measures along with other site-specific avoidance and minimization measures as identified in this EA.

Sunflower may opt to construct a second phase of the Project consisting of a 91 MW addition, which would bring the total nameplate capacity to 201 MW, consistent with Sunflower's interconnection request filed with Western on October 1, 2009. In addition, Sunflower may also request to operate the 110 MW project analyzed in this EA above the 438,000 MWh annual production cap. In both cases, the environmental impacts of a potential second phase or operations above the 438,000 MWh production cap will be analyzed in a separate EA, which is expected to tier from Western's Upper Great Plains Wind Energy Programmatic EIS and the associated ESA Section 7 consultation, once those documents are complete and have been adopted.

3.0 DESCRIPTION OF THE PROPOSED ACTION AND NO ACTION ALTERNATIVES

3.1 Proposed Action

3.1.1 Project Site

The Project Area for the Proposed Action encompasses approximately 12,709 acres of private lands in Stark and Morton counties, North Dakota (see Figure 2). The Project site was selected on the basis of the following factors:

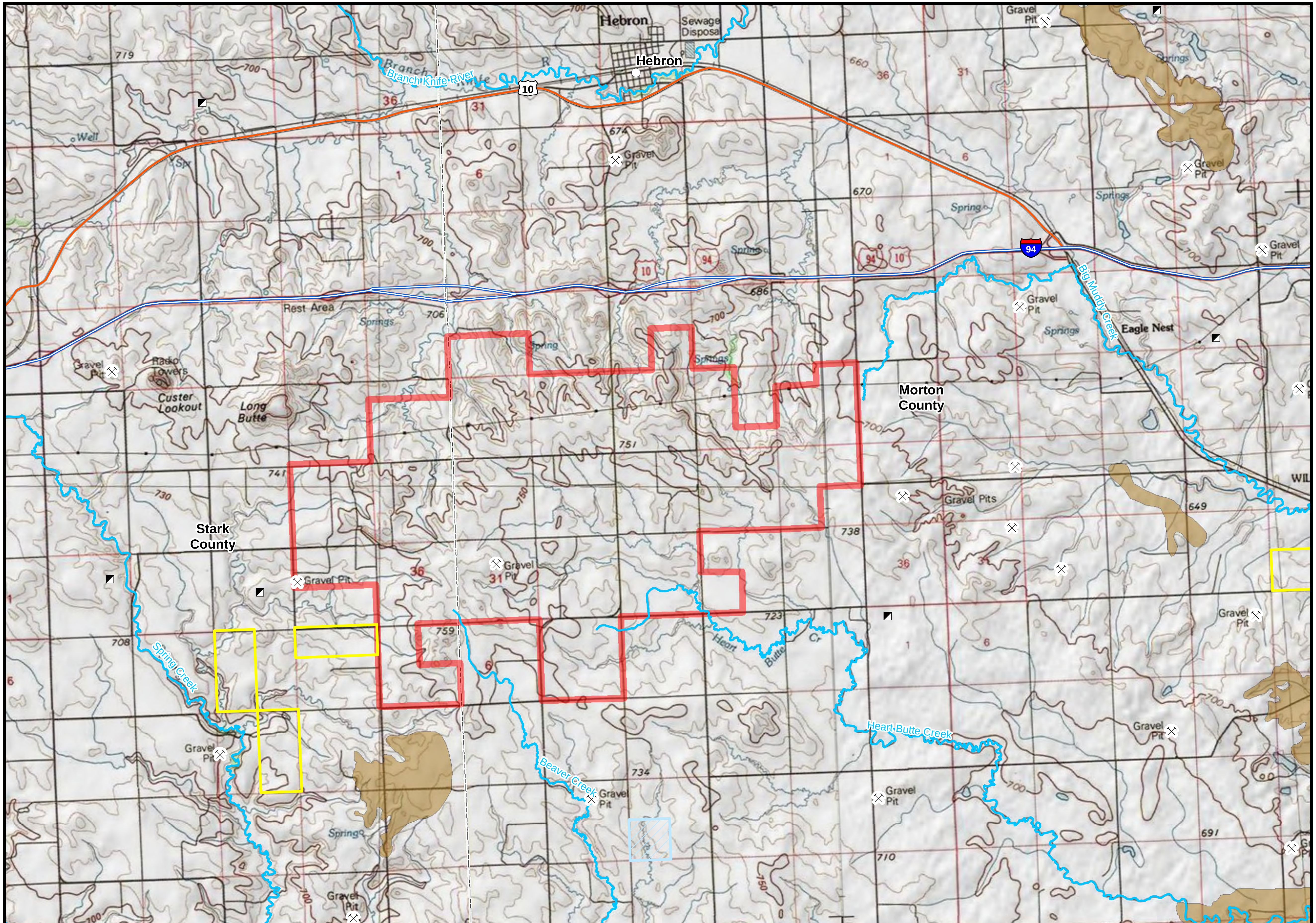
- The site has a favorable wind profile.
- The location of the Dickinson-Mandan transmission line running through the Project Area eliminates the need for a Project-specific transmission line, lowering both the cost and the environmental impact of the Project.
- A Critical Issues Analysis completed in January 2011 (included in Appendix D) concluded that environmental constraints in the Project Area could be avoided or successfully mitigated.
- Wind energy projects are generally accepted in the local community, and local landowners are willing to participate in the Project.

The Project Area for the Proposed Action is located in the following sections of land:

- Township 139N, Range 90W:

    - Sections 19, 20, 21, 26 through 34;
    - South ½ Sections 18, 22, 23;
    - West ½ Section 35;
- Township 139N, Range 91W:
    - Sections 25, 26, 35, 36
- Township 138N, Range 90W:
    - Section 5;
    - North ½ Section 6;
- Township 138N, Range 91W:
    - North ½ Section 1

Sunflower has completed preliminary engineering, design and layout at a level sufficient to analyze the potential impacts of the Project. Preliminary locations of micrositing corridors, collection lines, the substation and interconnection switchyard, and access roads have been established (see Figure 3). Sunflower may follow construction of the Project with a second phase, or request to exceed the 438,000 MWh production cap noted above. If a second phase of the Project is proposed, Sunflower would complete additional environmental surveys and wind resource evaluations for the expanded Project Area as needed

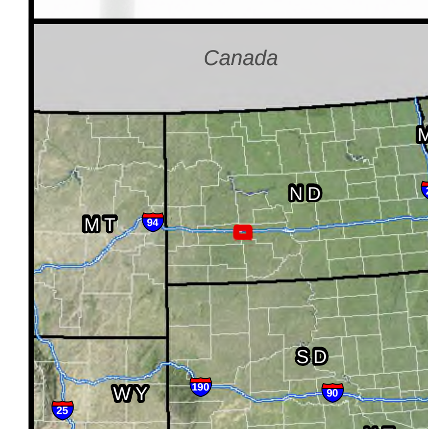


Sunflower Wind Project Environmental Assessment

Figure 2 Project Area

Morton and Stark Counties, ND
April 2014

- Project Area
- State Lands
- NDGFD PLOTS Land
- Economic Coal Deposits
- County Boundary
- Abandoned Mines
- Gravel Pit
- Existing Transmission Line
- Railroad
- Interstate Highway
- Federal Highway
- Stream or River
- City/Town



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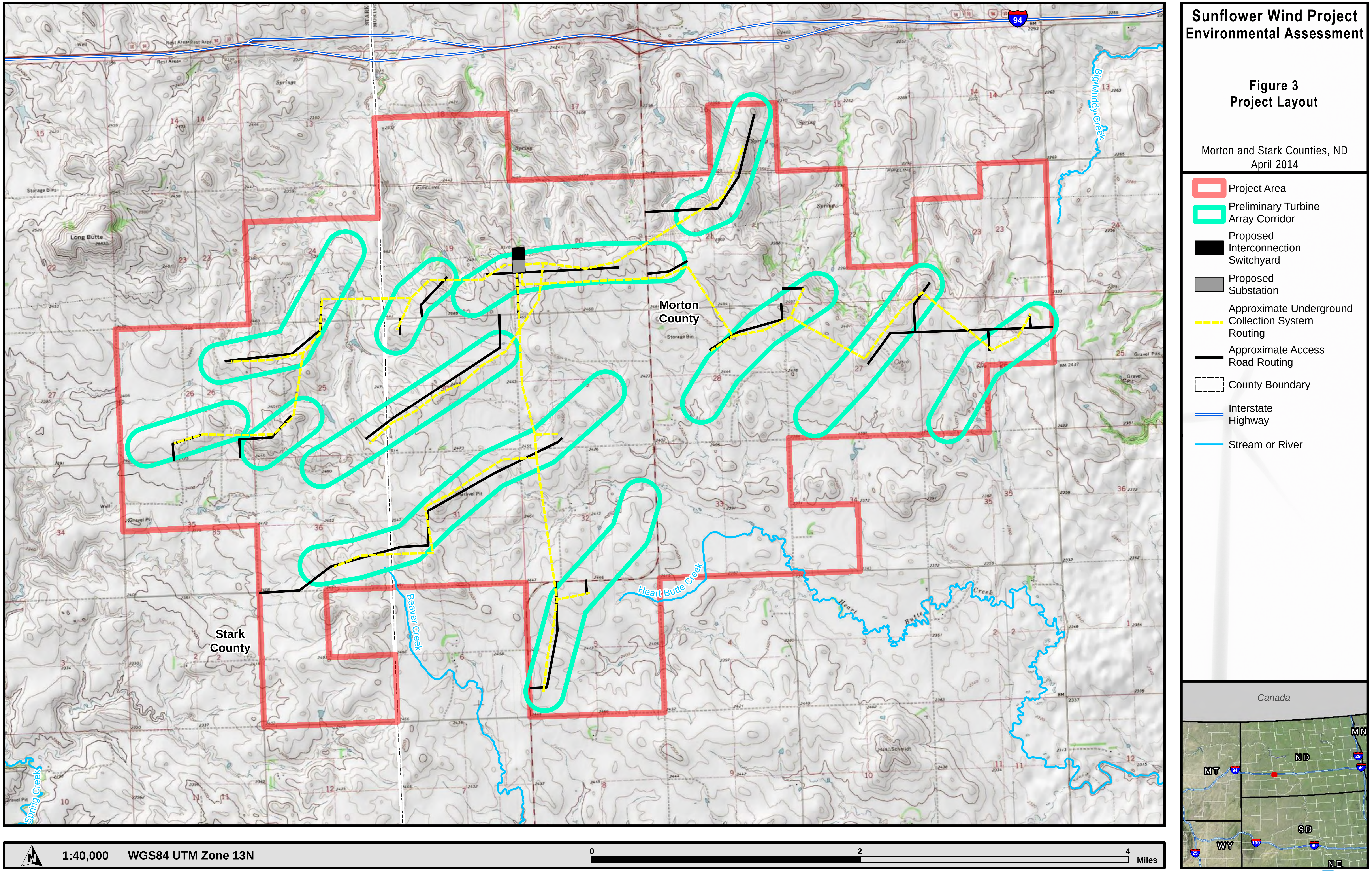

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3.1.2 Project Components

The Proposed Action would include the following components.

Turbines

The Proposed Action would include between 47 and 64 turbines, depending on the turbine model chosen. Sunflower is considering use of five potential turbine models, as indicated in Table 2.

Table 2. Potential Turbine Models

Specification	Turbine Option 1	Turbine Option 2	Turbine Option 3	Turbine Option 4	Turbine Option 5
Manufacturer	Vestas 2.0 V-110	Vestas 2.0 V-100	GE 1.7-100	GE 1.85-87	Siemens 2.3-108
Rated Output (MW)	2.0	2.0	1.7	1.85	2.3
Tower Height	80, 95m available (262 or 312 ft)	80, 95, 120m available (262, 312 or 394 ft)	80, 96m available (262 or 315 ft)	80m (262 ft)	80m (262 ft)
Rotor Diameter	110m (361 ft)	100m (328 ft)	100m (328 ft)	87m (285 ft)	108m (354 ft)
Total Height[\a]	150m (492 ft)	170m (558 ft)	146m (479 ft)	124m (407 ft)	134m (440 ft)
Minimum Ground to Rotor Clearance	25m (82 ft)	30m (98 ft)	30m (98 ft)	36.5m (120 ft)	26m (85 ft)
Rotor Swept Area (RSA)	9503 m^2 (102,289 ft^2)	7854 m^2 (84,540 ft^2)	7854 m^2 (84,540 ft^2)	5945 m^2 (63,991 ft^2)	9144 m^2 (98,425 ft^2)
Minimum (cut-in) Wind Speed	3 m/s (6.7 mph)	3 m/s (6.7 mph)	3m/s (6.7 mph)	3m/s (6.7 mph)	3m/s (6.7 mph)
Maximum (cut-out) Wind Speed	20 m/s (44 mph)	20 m/s (44 mph)	25 m/s (56 mph)	25 m/s (56 mph)	25 m/s (56 mph)
Total Number of Turbines (maximum)	55	55	64	59	47

\a Total height using the tallest turbine tower available as a conservative assumption.

Figure 4 shows a schematic of a typical wind turbine generator.

Turbines will be located within the identified turbine array corridors, which are approximately 1,000 feet wide (see Figure 3). Final turbine locations will be chosen during final engineering design to minimize environmental impacts to the greatest extent feasible based on the results of final surveys and selection of one of the turbine options noted in Table 2.

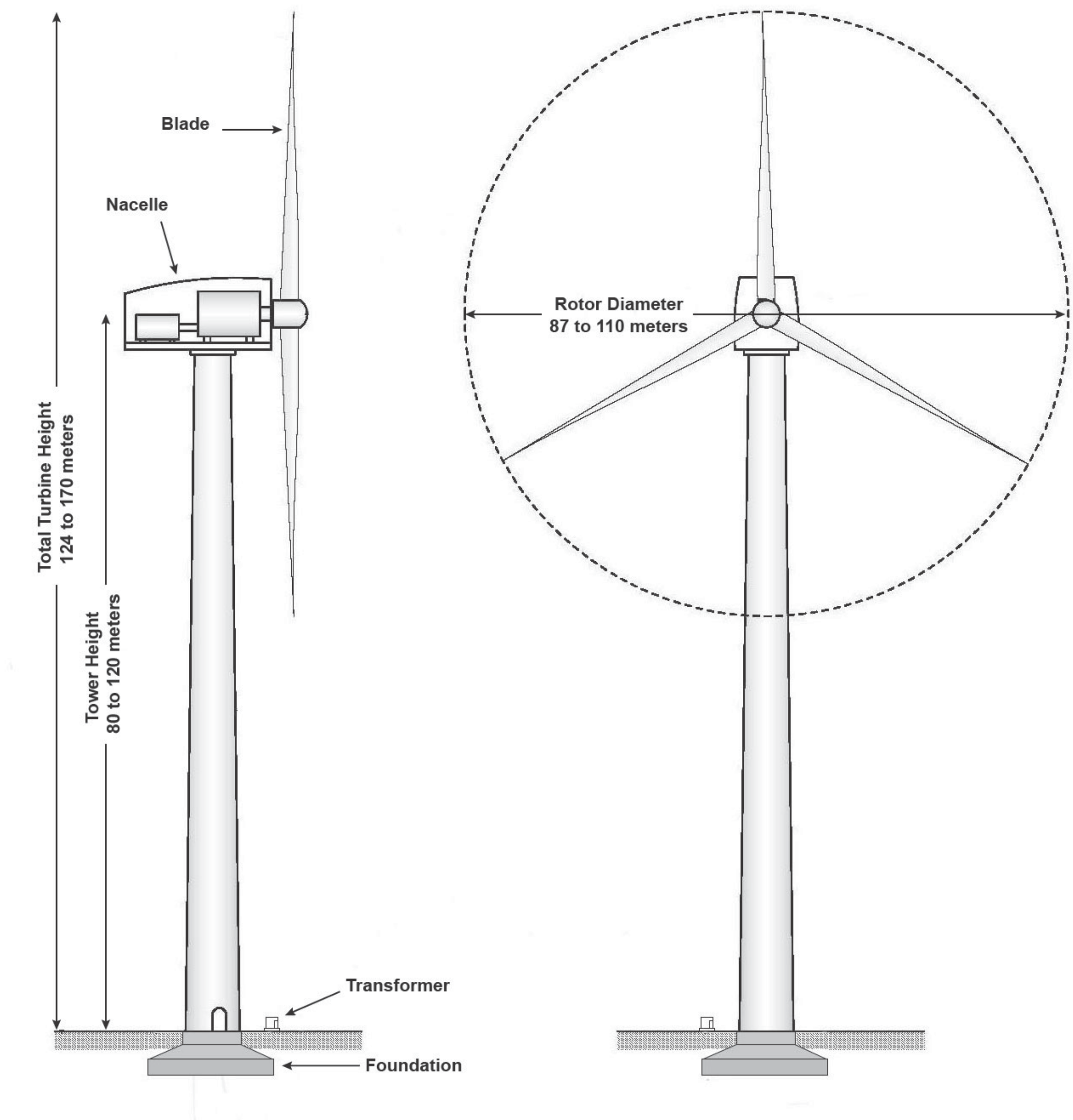


Figure 4. Schematic of Typical Wind Turbine

Lightning Protection

Each turbine will be equipped with a lightning protection system. The lightning protection system will be installed during foundation work, and will be designed for local soil conditions. The resistance to neutral earth will be in accordance with local utility or code requirements.

Foundations

Each turbine will rest on a concrete foundation. The final design of the foundations will be determined based on the results of geotechnical investigations and the turbine design chosen, however for the purpose of impact calculations, foundations are assumed to be circular, up to 65 feet across at the base, and to extend up to 12 feet below grade.

Aircraft Lighting

Some of the turbines will be equipped with aircraft warning lights as required by FAA Advisory Circular 70/7460-1, Obstruction Marking and Lighting. Chapter 2 of the Advisory Circular states that, "[a]ny temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet above ground level or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted." The chapter notes that in some cases structures over 200 feet may not need to be marked or lighted if the aeronautical study shows that the structures would not impair aviation safety without markings.

Based on FAA Circular 70/7460-1K, Chapter 13, turbine lighting will most likely consist of an array of red flashing lights, synchronized to flash simultaneously. Lights are not required on all turbines; lights would be installed on turbines nearest the Project perimeter to define the outer boundaries of the obstruction area, and on select turbines within the Project such that lights are no more than 0.5 miles apart. Daytime lighting is not required. Sunflower will submit a Notice of Proposed Construction or Alteration to the FAA as required pursuant to 14 CFR 77 Subpart B, Section 77.5-7 and will base final lighting design on FAA recommendations.

Electrical Collection System

A step-up transformer will be used at each turbine location to raise the voltage to the power collection line voltage of 34.5 kV. The power from these transformers will be run through an underground collection system consisting of direct-buried cables, generally located alongside the Project access roads (see Figure 3).

The collection line cables would be laid in trenches approximately two feet wide and four feet deep; the cables will be buried a minimum of 42 inches deep. All trenches would be filled with compacted material and associated temporary impacts would be restored following burial of electrical cables. Sunflower does not anticipate the need to use any overhead collection lines. Should collection lines cross wetlands or other sensitive features, horizontal directional drilling (HDD) below the features will be used to avoid impacts if rerouting is not possible.

Project Substation and Interconnection Switchyard

The Proposed Action would include one substation where power from the turbines would be aggregated and stepped up to transmission line voltage, and one interconnection switchyard, both located adjacent to the Dickinson-Mandan transmission line. The substation will be approximately 5 acres in size, and the interconnection switchyard will be approximately 3 acres in size. The 34.5 kV collection lines will terminate at the substation and voltage will be raised to 230 kV; power would then be routed to the adjacent interconnection switchyard, where facilities would be constructed to feed power into Western's transmission line. The approximate location of the substation and interconnection switchyard are shown on Figure 3; the final location may be adjusted prior to construction to minimize environmental impacts to the greatest extent practical.

Pursuant to Sunflower's interconnection request, the project substation and interconnection switchyard will be constructed to support 201 MW of electrical generation; this would allow for a potential future expansion of the Project without necessitating upgrades to these facilities.

Met Tower

The permanent met tower would be approximately 80 meters (262 feet) high when installed. The tower would be un-guyed and secured to a concrete foundation.

Access Roads

Access roads will be built to each turbine and the met tower and will be used during both construction and operation. Access roads will be initially constructed at 36 feet wide and will have an aggregate surface adequate to support the size and weight of construction and maintenance vehicles. The permanent roads will be narrowed to 16 feet wide following completion of turbine construction. Up to approximately 13.7 miles of access roads will be needed for the Proposed Action; however, the final length of access roads will be determined by the specific turbine locations in the final Project design. Access roads will be on private land and will not be open to public use.

Large construction cranes may spend as little as one day at each turbine site before moving on to the next. Cranes are sometimes moved cross-country rather than by using the developed access roads, especially where these roads are crossed by overhead utility lines. This type of cross-country walking enables the crane to be moved without complete de-rigging and disassembly, which is time-consuming and costly. Where cranes would travel cross-country, workers would lay down some form of cribbing, bedding or mats to support the weight of the crane without impacting the ground below. The cribbing or mats would be removed immediately following passage of the crane, to be re-used elsewhere.

Microwave Tower

A microwave communications tower may be constructed within the interconnection switchyard, in order to provide Western with remote data acquisition and facility control. The microwave tower would be approximately 30 meters (100 feet) in height, and would utilize a non-guyed steel lattice design.

Operation and Maintenance Facility

The Project will include an Operation and Maintenance (O&M) facility, which will consist of an approximately 5,000 square foot metal building with a fenced gravel parking area. The size of the entire facility would be approximately 5 acres. The location of the O&M facility will be selected during final design using the results of final resource surveys so as to minimize environmental impacts to the greatest extent practical.

The O&M facility will house the Supervisory Control and Data Acquisition (SCADA) system, which will allow control and monitoring of the wind farm. The SCADA communications system permits automatic, independent operation and remote supervision, thus allowing the simultaneous control of many wind turbines. The SCADA system will provide detailed operating and performance information for each wind turbine and will track each wind turbine's operational history.

Construction Laydown Area

Construction of the Project will require the establishment of one construction laydown area, which will be used for the temporary storage of construction materials and equipment, a concrete batch plant (if needed) and the construction office. The laydown area will cover a total of up to approximately 15 acres. The location of the laydown area will be selected during final design using the results of final resource surveys so as to minimize impact to sensitive resources.

Reconductoring of Western's Existing Transmission Line

Western's review of Sunflower's interconnection request has determined that a network upgrade is required to support the new electrical generation that would be created. Specifically, approximately 20 miles of the existing Mandan-Ward transmission line and approximately 8 miles of the existing Ward-Bismarck 230 kV transmission line would need to be upgraded with new conductor wires capable of carrying the additional electrical current. The locations of these two upgrade sections are shown on Figure 1.

3.1.3 Construction Procedures

The general sequence of activities through construction of the Project includes the following:

- Ordering components with long lead times, including towers, nacelles, blades, and transformers;
- Complete surveys needed for final locations of Project components;
- Final Project layout including turbine micrositing and road location;
- Soil borings, testing and analysis for final foundation design;
- Construction of access roads;
- Construction of underground collection lines;

- Construction of the Project substation and interconnection switchyard;
- Installation of tower foundations;
- Tower placement and wind turbine erection;
- Acceptance testing of facility; and
- Commencement of commercial production.

Construction Waste Management

Debris associated with construction may include construction materials such as packaging material, crates, reels, and parts wrapping. This debris may also include excess excavated soil and removed vegetation. Materials with salvage value will be removed from the Project Area for reuse. Excavated soils will be back-filled within the area of permanent disturbance and restored in compliance with applicable guidelines. If necessary, solid waste, including topsoil or other excavated materials not otherwise disposed of, would be temporarily stored within the corridor or within the temporary construction easements, and then transported to appropriate disposal facilities in accordance with federal, state, and local regulations.

Construction Management

Sunflower will engage the services of an engineering, procurement, and construction (EPC) contractor, which will have primary responsibility for construction management. The EPC contractor will use the services of local contractors where possible and appropriate.

Post-Construction Site Restoration

Following construction, areas not maintained as permanent facilities will be reclaimed for their prior land use. Reclamation will initially consist of grading to replace the approximate original contour and drainage of disturbed areas. Grading will include removal of any temporary structures. Following grading, salvaged topsoil will be spread and blended with adjacent areas to provide a growth medium for vegetation. Soil that has been compacted by equipment operation will be tilled to alleviate compaction. Where natural regrowth of vegetation is not anticipated, disturbed areas will be reseeded in accordance with landowner agreements or with regionally native species. Trees removed during construction operations will be replaced at ratios and using plant species to be determined in consultation with federal and state agencies as appropriate. Noxious weeds will be controlled in accordance with state regulations.

Commissioning

The Project will be commissioned after completion of the construction phase. The Project will undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing will occur for each component of the wind turbines, as well as the communication system, meteorological system, obstruction lighting, high voltage collection and feeder system, and the SCADA system. Once testing is complete, the Project will begin commercial operations.

Construction Schedule

Construction of the Proposed Action would commence in early 2015, and continue through the year, requiring a total of approximately 10 months. Commercial operation would begin following testing and commissioning.

3.1.4 Project Operation and Maintenance

Project operation and maintenance consists of continuous remote monitoring through the SCADA system and regular on-site maintenance approximately every six months. On-site maintenance includes operational checks and tests and regular preventive maintenance.

3.1.5 Decommissioning

The Project would have an anticipated life of 30 years, based primarily on the projected life of the turbines. At the end of that period or at Sunflower's option, Project components may be upgraded and the Project continued in use or the Project may be decommissioned. Prior to commencement of decommissioning, Sunflower will file a decommissioning plan with the North Dakota Public Service Commission which meets the requirements of NDAC 69-09-09-06.

In the event that the Project is decommissioned, all towers and turbine generators, transformers and overhead cables would be dismantled and removed. Underground cables would be removed to a minimum depth of 24 inches below ground. Foundations, buildings and ancillary equipment would be removed to a minimum depth of 36 inches below ground. Unless a landowner requested the retention of access roads or other disturbed areas, access road surface materials would be removed and all disturbed areas would be restored and reclaimed to approximate pre-Project contours. Areas disturbed by construction and decommissioning activities would be graded, topsoiled, and reseeded according to agency recommendations and landowner specifications.

In addition to Sunflower's regulatory obligations for infrastructure removal related to decommissioning, Sunflower's easements require the creation of a restoration fund. At the 11th year of operation, Sunflower is required to create a restoration fund through a federally chartered bank for each turbine associated with the Project and continue to make annual contributions through the life of the Project. The restoration fund is intended to secure Sunflower's obligations under its easements related to the decommissioning and removal of the project components. If Sunflower were to go bankrupt, the landowner would then have access to the restoration fund in order to pay for the removal costs associated with Project infrastructure.

3.2 No Action Alternative

Under the No Action Alternative the Project would not be built. No other interconnection partners would be sought, given that the Project was designed to take advantage of the presence of Western's existing transmission line and no other non-federal transmission lines are located near the Project Area. This alternative would avoid the potential environmental impacts of the action alternatives; including the potential positive impacts such as the displacement of CO_2 emissions and the economic benefits to Stark and Morton Counties. Environmental conditions within the Project Area, as described in Section 4, would be expected to persist in their existing state.

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the existing environmental conditions and potential environmental impacts resulting from the construction, operation, and maintenance of the Project.

4.1 Scope of the Analysis

The sections that follow discuss the direct and indirect effects of the Project to each of the environment components analyzed. Direct effects are those which are caused by the proposed action and occur at the same time and place (40 CFR 1508.8(a)). Direct effects would include, for example, the physical loss of habitat to new access roads, or potential direct mortality to birds from collision with turbine blades.

Indirect effects are those which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40CFR 1508.8(b)). Examples of indirect effect include impacts to predator species resulting from the direct loss of habitat for prey species, or impacts to bird species from the energy used in avoiding wind turbines.

Impacts may also be permanent or temporary. Permanent impacts are those which will last for the life of the Project, and include the establishment of permanent access roads, turbine foundations, the substation and interconnection switchyard, and the O&M building. Temporary impacts are those which would last only for the period of construction and then either cease or be restored. Examples of temporary impacts include temporary increases in traffic or housing demand during construction, or temporary impacts to habitat at construction laydown areas.

The analysis area for environmental impacts includes the full geographic extent of the potential effect to that resource. Most Project impacts would be limited to the Project site; examples would be impacts to geology and soils or wetlands. Other impacts could extend off the Project site, such as potential impacts to raptors, which may nest off-site.

The preliminary Project layout presented in this EA describes turbine corridors but not the specific location of each turbine or the final turbine type to be used. For this reason, the analysis of the impacts of the turbines assumes both the turbine type and the Project layout with the largest potential impacts to each element of the environment. The turbine type used may not be the same for each analysis, for example the turbine with the largest rotor-swept area may not be the turbine with the loudest noise or the largest visual impact. The final turbine layout will be determined prior to construction and will reflect additional survey data, final engineering design, and Sunflower’s ongoing process of avoidance and minimization.

Because conservative assumptions have been used throughout, final impacts are expected to be lower than those presented here. Both Sunflower and Western believe that the impacts presented in this EA represent reasonable worst-case estimates.

The analysis presented in the following sections also responds to the concerns expressed at the scoping meeting held on August 22, 2013, and agency concerns expressed at that meeting and during ongoing consultation. The primary concerns expressed related to economic impacts to participating landowners.

4.2 Overall Ground Disturbance Impacts

- Table 3 presents overall Project temporary and permanent ground disturbance for each major Project component. The impact areas calculated are based on the preliminary facility layout shown in Figure 3. These values are considered worst-case impact estimates. The assumed number of turbines is a maximum number based on use of the GE 1.7-100, the turbine with the lowest output and therefore the largest number of turbines needed.
- The assumed 15-acre size for the laydown area is considered the largest area potentially needed.
- The impact area for access roads assumes that all access roads will be new construction, and does not include the use of existing farm roads.
- The impact area for collection lines assumes that the lines will be adjacent to existing or new access roads and will not be in existing disturbed areas. In fact, most collection lines will be located in the access road footprint and will not represent new impacts.

Table 3. Overall Temporary and Permanent Ground Disturbance

Project Component	Assumptions	Proposed Action		
		Impact Multiplier	Permanent Impact (acres)	Temporary Impact (acres)
Turbines	Permanent: 65-foot diameter turbine pad; Temporary: Up to 200-foot radius around towers.	Up to 64 turbines	5.1 ac	184.5 ac
Access roads	Permanent: 16-foot finished width; Temporary: 36-foot initial construction width	13.7 miles of access roads	26.6 ac	33.2 ac
Substation	Permanent: Area within substation/ interconnection switchyard fenceline; Temporary impacts: None	5 acre fenced substation and 3 acre fenced interconnection switchyard	8 ac	0 ac
O&M facility	Permanent: 5-acre site; Temporary: none	5 acre site	5 ac	0 ac

Project Component	Assumptions	Proposed Action		
		Impact Multiplier	Permanent Impact (acres)	Temporary Impact (acres)
Construction laydown area	Permanent: None; Temporary: Area within temporary fenceline	Up to 15 acre temporary site	0 ac	15 ac
Collection lines	8 feet wide temporary impact	19.3 miles collection lines	0 ac	18.7 ac
Totals			**44.7 ac**	**251.4 ac**

Reconductoring of segments of Western's Mandan-Ward and Ward-Bismarck transmission line would have minimal disturbance impacts. Reconductoring work would take place entirely within the existing transmission line right-of-way, and would utilize existing access roads and existing transmission support towers; no additional facilities or structures would be needed to complete that work.

4.3 Geology and Soils

This section discusses potential Project impacts to geology and soils, including prime farmland and farmland of statewide importance.

4.3.1 Existing Conditions

Elevation and Topography

Topography within the Project Area is slightly rolling to rolling, with the steepest topography occurring to the southwest. Elevation ranges from approximately 2,230 feet to 2,360 feet above sea level.

Geology and Mineral Resources

Surficial geology within the Project Area consists of glacial sediments deposited during the Holocene to Pre-Wisconsinan Period (Bleumle 1988, Clayton 1980; both cited in HRD 2011, see Appendix D). The primary deposits that define the Project Area are collapse/draped transition sediments. The glacial sediment is characterized by hummocky topography that has draped over and partially obliterated the topography existing before the glacial advance. An area of ring-shaped hummocks is located along the west end of the Project Area. The sediments are described as an unbedded, unsorted mixture of clay, silt, sand, and pebbles with a few cobbles and boulders. The glacial deposits can be as thick as 100 feet.

The bedrock geology of the Project Area consists of Sentinel Butte Formation from the Tertiary System. The Sentinel Butte Formation consists of gray-brown bentonitic claystone, siltstone, sandstone, and lignite. The sandstone is thin bedded and is generally fine-grained and silty. This formation can be up to 510 feet thick.

There is one economic coal deposit in the general area, to the southwest of the Project Area (see Figure 2). This deposit meets the minimum criteria established by coal companies operating surface mines in North Dakota (Murphy 2007; cited in HDR 2011, see Appendix D). This deposit has not been mined and does not represent an active mining area. No economic coal deposits were identified within the Project Area.

No active or previously active gravel pits are located within the Project Area. Ten gravel pits were identified within 3 miles of the Project Area, located primarily to the south. There is one known mine shaft or drift that has been identified approximately 0.75 miles west of the Project Area. This mine is listed in the PSC's Abandoned Mines database as a surface mine, and based on aerial photography of the site it appears to have been recently reclaimed; however, no other information about the mine is available.

Investigations of public maps and local geology did not identify any fossil collection sites in the immediate vicinity of the Project Area.

Seismic Risk

No recorded areas of seismic activity or subsidence were identified in the Project Area. According to the North Dakota Geographic Survey (NDGS), North Dakota is located in an area of very low earthquake probability. There are no known active tectonic features in south-central North Dakota and the deep basement formations underlying North Dakota are expected to be geologically stable (Bluemle 1991). This information is supported by U.S. Geographic Survey (USGS) seismic hazard maps, which show that the Project Area is located in an area with very low seismic risk (USGS 2008). Related geologic hazards, such as soil liquefaction, are therefore also unlikely.

Soil Resources

The U.S. Department of Agriculture (USDA) has mapped 86 soil map units within the Project Area (Figure 5; USDA 2009). These soils are primarily well-drained loams and silt loams derived from the underlying glacial deposits and, to a lesser extent, the underlying sandstones and siltstones.

According to the Soil Survey of Morton County (USDA 2002), wind erosion may be a hazard on most of the soils in Morton County. Water erosion is a severe hazard on gently rolling and steeper soils, and is greatest when the surface is bare.

Farmland

The Project Area consists mostly of farmland areas classified as not prime farmland[1] (76.6 percent). The remaining area is mostly farmland of statewide importance (22.3 percent). Figure 5 shows the prime farmland and farmland of statewide importance soil classifications.

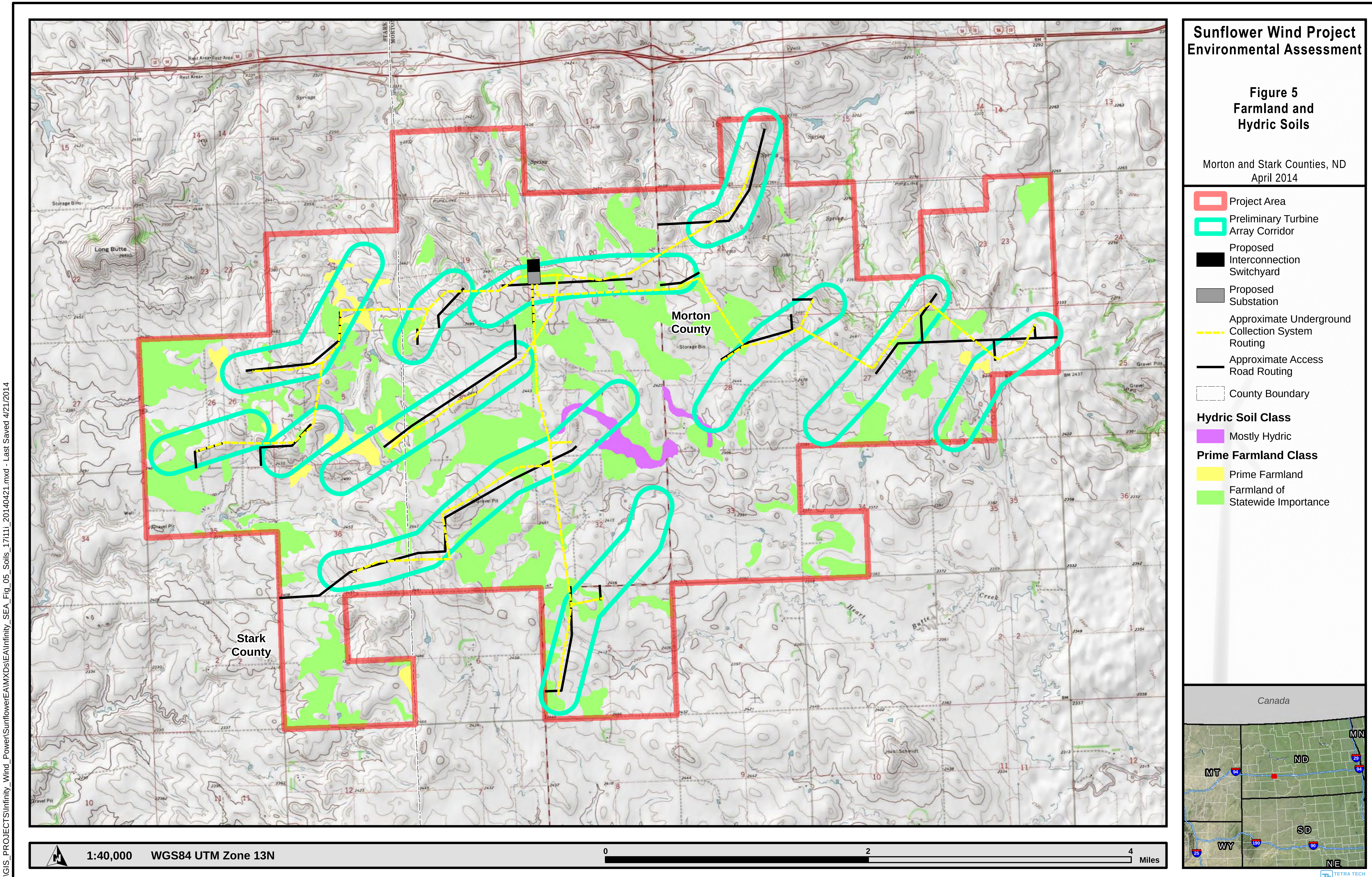
[1] Prime farmland soils are defined in the USDA-NRCS Title 430 National Soil Survey Handbook, issued November 1996, as follows: "Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically

According to NRCS soils data, about 23,781 acres, or 1.9 percent of Morton County, is considered Prime Farmland, and 327,369 acres, or 26.3 percent is classified as Farmlands of Statewide importance. In Stark County, approximately 28,666 acres, or 3.3 percent of the county, is considered Prime Farmland, and 226,619 acres, or 26.4 percent, is Farmland of Statewide Importance. These percentages are reasonably similar to the Project Area, as shown in Table 4. However, the acres of Prime Farmland or Farmland of Statewide Importance within the Project Area would be extremely small as a percentage of the total amount Prime Farmland or Farmland of Statewide Importance in the two-county area, at one quarter and on half of one percent. As described in Section 4.3.2, the amount of Prime Farmland or Farmland of Statewide Importance actually impacted by the Project would be a very small percentage of the Prime Farmland or Farmland of Statewide Importance within the Project area, and an even smaller percentage of that within the two-county area

Table 4. Farmland Soils

Farmland Soil Type	Acres in Project Area	Percentage of Project Area	Acres in Two-County Area	Acres in Project Area as a Percent of Two-County Area
Prime Farmland	129.4	1.02%	52,447	0.24%
Farmland of Statewide Importance	2,830.2	22.27%	553,988	0.51%
Not Prime Farmland	9,749.8	76.71%		
Project Area Total	**12,709.5**	**100%**		

sustained high yields of crops when treated and managed according to acceptable farming methods, including water management" (USDA 1996).



Sunflower Wind Project
Environmental Assessment
Figure 5
Farmland and Hydric Soils
Morton and Stark Counties, ND
April 2014
Project Area
Preliminary Turbine Array Corridor
Proposed Interconnection Switchyard
Proposed Substation
Approximate Underground Collection System Routing
Approximate Access Road Routing
County Boundary
Hydric Soil Class
Mostly Hydric
Prime Farmland Class
Prime Farmland
Farmland of Statewide Importance
Morton County
Stark County
Canada
MT
ND
SD
WY
MN
NE
1:40,000
WGS84 UTM Zone 13N
0
2
4
Miles
TETRA TECH
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4.3.2 Potential Impacts

A significant impact to geology and soils would occur if: 1) erosion results in irreversible impacts to other resources, or 2) there is a loss of mineral resources that are not available elsewhere.

Direct Impacts

The Project would result in direct, permanent impacts to soils through the establishment of turbine foundations, access roads, and the substation and interconnection switchyard, and the O&M facility. These impacts will remove soils from agricultural production for the life of the Project. The Project would result in temporary impacts at the construction laydown area, the portions of Project access roads used for construction and then reclaimed, and temporary construction areas surrounding each turbine.

The Proposed Action would create approximately 45 acres of permanent impact and 251 acres of temporary impact to soils. The specific soil types impacted will depend on the final Project design. Sunflower will avoid impacts to soils particularly sensitive to erosion as described below.

Based on preliminary design data, the Proposed Action would permanently impact up to 0.6 acres of Prime Farmland and 13.1 acres of Farmland of Statewide Importance, and would temporarily impact approximately 1.0 acre of Prime Farmland and 17.7 acres of Farmland of Statewide Importance. These preliminary impact figures represent approximately 0.04 percent and 0.46 percent of Prime Farmlands and Farmlands of Statewide Importance, respectively, within the Project Area. Impacts to Prime Farmland and Farmland of Statewide Importance are expected to be further reduced through final engineering design, as these soil types will be avoided to the extent practicable.

Because of the relatively gentle relief in the Project Area, the deliberate avoidance of steep slopes, and the use of appropriate BMPs during and following construction, the potential for soil loss due to erosion would be low. Impacts to hydric soils such as compaction are expected to be minimal due to the micrositing of Project facilities to avoid wetlands and other areas with hydric soils.

Sunflower will restore areas disturbed by construction to approximate pre-construction conditions. Soil erosion, compaction, and other related disturbance would be short-term, and would be minimized by implementing environmental protection measures including appropriate access road design and stormwater management BMPs, hazardous materials handling and spill response procedures, regular maintenance of access roads, decompaction of temporary disturbance areas as needed, implementing dust control measures to limit wind erosion and revegetation of disturbed areas. The loss of organic matter would be limited through implementation of stormwater management BMPs, and by stripping and stockpiling topsoil in disturbance areas and using stockpiled topsoils to finish restoration of temporary disturbance areas. With the proper implementation of environmental protection measures intended to prevent, minimize, and/or reclaim soil erosion, compaction, and spill effects, no unmitigated loss of highly productive soil would result from implementation of the Project.

The Project would not create direct impacts to mineral resources or other regional geology. No economic lignite deposits are located within the Project Area and no coal mining is present. Sand and gravel are plentiful locally and the presence of the Project would not necessarily prevent either from being mined in the Project Area. Direct impacts to geology and soils are therefore not anticipated to be significant.

Geologic hazards such as seismicity, landslide, or subsidence would not be concerns for the Project. The region is considered to be seismically stable, and no areas of subsidence, liquefaction, mass movement or other geologic hazards have been identified in the Project Area. Project facilities would be microsited to avoid such areas if any are identified during final design, and implementation of appropriate engineering design, primarily for turbine foundations, would reduce the impacts of geologic hazards to a non-significant level.

Reconductoring of the Mandan-Ward or the Ward-Bismarck transmission line would cause no additional impacts to geology or soils. The work would take place entirely within Western's existing transmission right-of-way and would utilize existing access roads. No excavation or disturbance outside of already-disturbed areas would be necessary, so impacts to farmland soils would be avoided. No new structures or modifications to existing structures would be needed, so this component of the Project would not impact or be impacted by geologic conditions or hazards.

Indirect Impacts

The Proposed Action would have no indirect impacts to soils or geology.

Avoidance, Minimization and Best Management Practices

Impacts to Prime Farmland and Farmland of Statewide Importance will be minimized by siting wind turbines, access roads, and other permanent and temporary Project infrastructure off of these farmland soil types to the extent practical. The Project would make use of existing farm access roads as much as possible, and would place wind turbines at the edges of farm fields to minimize additional disruptions to cropland. Collector lines would generally be placed within or adjacent to the access roads to minimize impacts.

Sunflower will implement avoidance and minimization measures as identified in the Draft UGP Wind Energy PEIS (see PEIS section 5.2.3.1, and PEIS section 5.12.1.4), including the following:

- Avoid placement of wind energy facilities in areas with unsuitable seismic, liquefaction, slope, subsidence, settling, and flooding conditions.
- Minimize the extent of the project footprint, including improved roads and construction staging areas.
- Minimize ground-disturbing activities, especially during the rainy season.
- Use existing roads and disturbed areas to the extent possible.
- Site new roads to follow natural land contours; excessive slopes should be avoided.
- Site new roads to avoid stream crossings and wetlands and minimize the need to cross drainage bottoms.

- Surface new roads with aggregate materials, wherever appropriate.
- Restrict heavy vehicles and equipment to improved roads to the extent practicable.
- Control vehicle and equipment speed on unpaved surfaces.
- Conduct construction and maintenance activities when the ground is frozen or when soils are dry and native vegetation is dormant.
- Stabilize disturbed areas that are not actively under construction using methods such as erosion matting or soil aggregation, as site conditions warrant.
- Salvage topsoil from all excavation and construction activities to reapply to disturbed areas once construction is completed.
- Dispose of excess excavation materials in approved areas to control erosion.
- Isolate excavation areas (and soil piles) from surface water bodies using silt fencing, bales, or other accepted appropriate methods to prevent sediment transport by surface runoff.
- Use earth dikes, swales, and lined ditches to divert local runoff around the work site.
- Reestablish the original grade and drainage pattern to the extent practicable.

Reseed disturbed areas with a native seed mix and revegetate disturbed areas immediately following construction. Potentially applicable conservation measures for hazardous materials and wastes at wind energy facilities may include the following:

- Developers of wind energy facilities should prepare several plans addressing various aspects of hazardous materials and waste, including a hazardous materials and waste management plan, a construction and operation waste management plan, a fire management and protection plan, an integrated pest and vegetation management plan (if the facility will use pesticides/herbicides), and a spill prevention and emergency response plan. Such plans should include the following items:
    - Prepare a hazardous materials and waste management plan that addresses the selection, transport, storage, and use of all hazardous materials needed for construction, operation, and decommissioning of the facility for local emergency response and public safety authorities and for the regulating agency, and that addresses the characterization, on-site storage, recycling, and disposal of all resulting wastes. The plan should include a comprehensive hazardous materials inventory; Material Safety Data Sheets (MSDSs) for each type of hazardous material; emergency contacts and mutual aid agreements, if any; site map showing all hazardous materials and waste storage and use locations; copies of spill and emergency response plans (see below), and hazardous materials-related elements of a decommissioning/closure plan. The waste management plan should identify the waste streams that are expected to be generated at the site during construction and operation and address hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements (e.g., selecting appropriate waste storage containers, appropriate off-site treatment, storage, and disposal facilities), inspection procedures, and waste minimization procedures. The plan should address solid

and liquid wastes that may be generated at the site in compliance with CWA requirements if a NPDES permit is needed.
  - Develop a fire management and protection plan to implement measures to minimize the potential for fires associated with substances used and stored at the site. The flammability of the specific chemicals used at the facility should be considered.
  - If pesticides/herbicides are to be used on the site, develop an integrated pest and vegetation management plan to ensure that applications will be conducted within the framework of managing agencies and will entail the use of only EPA-registered pesticides/herbicides that are (1) nonpersistent and immobile and (2) applied by licensed applicators in accordance with label and application permit directions, following stipulations regarding suitability for terrestrial and aquatic applications.
- All site characterization, construction, operation, and decommissioning activities should be conducted in compliance with applicable Federal and State laws and regulations, including the Toxic Substances Control Act of 1976, as amended (15 USC 2601, et seq.). In addition, any release of toxic substances (leaks, spills, and the like) in excess of the reportable quantity established by 40 CFR Part 117 should be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances should be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.
- Pollution prevention opportunities should be identified and implemented, including material substitution of less hazardous alternatives, recycling, and waste minimization.
- Systems containing hazardous materials should be designed and operated in a manner that limits the potential for their release, and constructed of compatible materials in good condition (as verified by periodic inspections), including provision of secondary containment features (to the extent practical); installation of sensors or other devices to monitor system integrity; installation of strategically placed valves to isolate damaged portions and limit the amount of hazardous materials in jeopardy of release; and robust inspection and use of repair procedures.
- Dedicated areas with secondary containment should be established for off-loading hazardous materials transport vehicles.
- To the greatest extent practicable, “just-in-time” ordering procedures should be employed that would limit the amounts of hazardous materials present on the site to quantities minimally necessary to support continued operations. Excess hazardous materials should receive prompt disposition.
- Written procedures for the storage, use, and transportation of each type of hazardous material present should be provided, including all vehicle and equipment fuels.
- Authorized users for each type of hazardous material should be identified.
- Procedures should be established for fuel storage and dispensing, including shutting off vehicle (equipment) engines; using only authorized hoses, pumps, and other equipment in good working order; maintaining appropriate fire and spill response materials at

equipment-fueling stations; providing emergency shutoffs for fuel pumps; ensuring that fueling stations are paved; ensuring that both aboveground fuel tanks and fueling areas have adequate secondary containment; prohibiting smoking, welding, or open flames in fuel storage and dispensing areas; equipping the area with fire suppression devices, as appropriate; conducting routine inspections of fuel storage and dispensing areas; requiring prompt recovery and remediation of all spills, and providing for the prompt removal of all fuel and fuel tanks used to support construction vehicles and equipment at the completion of facility construction and decommissioning phases.

- Refueling areas should be located away from surface water locations and drainages and on paved surfaces; features should be added to direct spilled materials to sumps or safe storage areas where they can be subsequently recovered.
- Drip pans should be used under the fuel pump and valve mechanisms of any bulk fueling vehicles and during on-site refueling to contain accidental releases.
- Spills should be immediately addressed per the appropriate spill management plan, and cleanup and removal initiated, if needed. Operations and maintenance personnel should be trained in spill prevention and containment, and spill containment supplies should be located on site and be readily available.
- All vehicles and equipment should be in proper working condition to ensure that there is no potential for leaks of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials.
- Hazardous materials and waste storage areas or facilities should be formally designated and access to them restricted to authorized personnel. Construction debris, especially treated wood, should not be disposed of or stored in areas where it could come in contact with aquatic habitats.
- Design requirements should be established for hazardous materials and waste storage areas that are consistent with accepted industry practices as well as applicable Federal, State, and local regulations and that include, at a minimum, containers constructed of compatible materials, properly labeled, and in good condition; secondary containment features for liquid hazardous materials and wastes; physical separation of incompatible chemicals; and fire-fighting capabilities when warranted.
- Written procedures should be established for inspecting hazardous materials and waste storage areas and for plant systems containing hazardous materials; identified deficiencies and their resolution should be documented.
- Schedules should be established for the regular removal of wastes (including sanitary wastewater generated in temporary, portable sanitary facilities) for delivery by licensed haulers to appropriate off-site treatment or disposal facilities.
- During facility decommissioning, the following should occur: emergency response capabilities should be maintained throughout the decommissioning period as long as hazardous materials and wastes remain on-site, and emergency response planning should be extended to any temporary material and equipment storage areas that may have been established; temporary waste storage areas should be properly designated, designed, and equipped; hazardous materials removed from systems should be properly containerized and characterized, and recycling options should be identified and pursued; off-site transportation of recovered hazardous materials and wastes resulting from

decommissioning activities should be conducted by authorized carriers; hazardous materials and waste should be removed from on-site storage and management areas, and the areas should be surveyed for contamination and remediated as necessary.

BMPs to prevent soil erosion would be implemented during construction of the Project as required by the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit and the accompanying Project Erosion and Sedimentation Control Plan (ESCP). Sunflower expects that BMPs implemented through the NPDES permit would adequately capture those measures identified in the Draft PEIS.

Additional site-specific measures to further reduce impacts to soils may be identified and implemented as appropriate; however, impacts to soil resources are not expected to be significant.

4.4 Air Resources

4.4.1 Existing Conditions

A significant impact to air resources would result if federal or state air quality standards were exceeded during construction, maintenance, or operation of the Project.

The U.S. Environmental Protection Agency (EPA) and the North Dakota Department of Health (NDDoH) regulate air quality in North Dakota through implementation of the Federal Clean Air Act (CAA) (42 U.S.C. §§ 7401-7671q). The CAA requires the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from the effects of air pollution. The CAA defines NAAQS as levels of pollutant above which detrimental effects on human health and welfare could occur. A state or region is given the status of “attainment” if the NAAQS thresholds have not been exceeded for any criteria pollutant, or “nonattainment” for a specific pollutant if the NAAQS thresholds have been exceeded for that pollutant. Standards are provided for sulfur dioxide (SO2), carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3) particulate matter less than 10 microns (PM10), particulate matter less than 2.5 microns (PM2.5), and lead (Pb), which are known as the criteria pollutants.

The entire state of North Dakota is in attainment of all state and federal air quality standards, and no exceedences have been reported for at least the past ten years[2]. Relatively high concentrations of total suspended particulates (dust) may occur in springtime from farming operations and strong winds; however these have not exceeded and are not likely to exceed NAAQS.

4.4.2 Potential Impacts

[2] Annual reports of the North Dakota Department of Health Air Quality Monitoring program were reviewed for the years 2000 to 2011; these and additional annual reports are available online at: http://www.ndhealth.gov/AQ/AmbientMonitoring.htm

Direct Impacts

Direct impacts to air quality would include temporary increases in vehicle emissions and dust during construction. All such impacts would be limited to the period of construction, and are not expected to cause an exceedence of any NAAQS.

The only emissions related to operation of the Project would be extremely minor exhaust emissions from maintenance vehicles. These emissions would not cause any detectable impacts to regional air quality.

Indirect Impacts

The only indirect impact of the Project would be positive, since the Project has the potential to lower the need for additional thermal power plants, and thus to improve overall air quality in the region.

Avoidance, Minimization and Best Management Practices

Sunflower will implement measures applicable to reducing air quality impacts, as identified in the Draft UGP Wind Energy PEIS (see PEIS section 5.4.2), including the following:

General measures applicable to multiple phases of project development include the following:

- Use surface access roads, on-site roads, and parking lots with aggregates or that maintain compacted soil conditions to reduce dust generation.
- Post and enforce lower speed limits on dirt and gravel access roads to minimize airborne fugitive dust.
- Minimize potential environmental impacts from the use of dust palliatives by taking the necessary measures to keep the chemicals out of sensitive terrestrial habitats and streams. The application of dust palliatives must comply with Federal, State, and local laws and regulations.
- Ensure that all pieces of heavy equipment meet emission standards specified in the State Code of Regulations, and conduct routine preventive maintenance, including tune-ups to manufacturer specification to ensure efficient combustion and minimum emissions. If possible, equipment with more stringent emission controls should be leased or purchased.
- Employ fuel diesel engines in facility construction and maintenance that use ultra-low sulfur diesel, with a maximum 15 ppm sulfur content.
- Limit idling of diesel equipment to no more than 10 minutes unless necessary for proper operation.

Measures applicable during construction activities include the following:

- Stage construction activities to limit the area of disturbed soils exposed at any particular time.
- Water unpaved roads, disturbed areas (e.g., scraping, excavation, backfilling, grading, and compacting), and loose materials generated during project activities as necessary to minimize fugitive dust generation.

  - Install wind fences around disturbed areas if windborne dust is likely to impact sensitive areas beyond the site boundaries (e.g., nearby residences).
  - Spray stockpiles of soils with water, cover with tarpaulins, and/or treat with appropriate dust suppressants, especially when high wind or storm conditions are likely. Vegetative plantings may also be used to limit dust generation for stockpiles that will be inactive for relatively long periods.
  - Train workers to comply with speed limits, use good engineering practices, minimize the drop height of excavated materials, and minimize disturbed areas.
  - Cover vehicles transporting loose materials when traveling on public roads, and keep loads sufficiently wet and below the freeboard of the truck in order to minimize wind dispersal.
  - Inspect and clean tires of construction-related vehicles, as necessary, so they are free of dirt prior to entering paved public roadways.
  - Clean (e.g., through street vacuum sweeping) visible trackout or runoff dirt from the construction site off public roadways.
- No additional measures are considered necessary during normal operations of the Project, but some dust control measures discussed above may be applicable to minimize fugitive dust emissions from bare surfaces and unpaved access roads.
- Decommissioning activities generally mirror construction activities; thus, the same measures should be applied during decommissioning as would be applied during construction.

Additional site-specific measures may be identified and implemented to further reduce air quality impacts; however, impacts to air quality are not expected to be significant. Complaints regarding fugitive dust emissions will be addressed on a case-by-case basis with impacted parties.

4.5 Climate Change

4.5.1 Existing Conditions

The CEQ now requires that agencies consider the potential impacts of federal actions on climate change, as well as the potential impacts of climate change on a proposed action. In 2010, the CEQ released its Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ 2010), to help explain how agencies should analyze the environmental effects of greenhouse gas (GHG) emissions and climate change when they describe the environmental effects of a proposed agency action.

In the Draft Guidance, CEQ establishes a minimum threshold for GHG emissions[3] that would warrant a greater level of scrutiny, and potentially the implementation of mitigation measures to reduce GHG emissions. Specifically:

[3] GHGs are defined in the Draft Guidance as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The contribution of a given gas to the greenhouse effect is affected by both its abundance and its inherent characteristics, which include how efficient the molecule is at absorbing solar energy and its atmospheric lifespan. Each gas' global warming potential (GWP) is a

> If a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO_2-equivalent [CO_2e] GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 metric tons of CO_2-equivalent, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. (CEQ 2010)

CEQ considers 25,000 metric tons CO_2e per year to be a "useful indicator – rather than an absolute standard of insignificant effects – for agencies' action-specific evaluation of GHG emission and disclosure of that analysis in their NEPA documents." While there are no specific thresholds established for assessing the significance of climate change impacts, a meaningful impact may result if 1) the Project would result in direct emissions of 25,000 metric tons or more of CO_2e GHG emissions annually, or 2) anticipated changes to the climate would result in meaningful impacts to the function or safety of the Project over its expected lifespan.

The CEQ's threshold for potential significance is different than the thresholds for air quality permits under the EPA's Title V and Prevention of Significant Deterioration (PSD) programs, as established with the 2010 release of the Tailoring Rule. The Title V and PSD programs apply to new or modified major stationary air pollutant sources (e.g., power plants); the rules do not cover construction-related emissions from mobile sources (e.g., cranes, bulldozers, or construction worker vehicles).

Pursuant to the CEQ Guidance, agencies should also consider the potential impacts of global climate change on the proposed federal action. Climate change can affect the environment of a proposed action in a variety of ways. For instance, climate change can affect the integrity of a development or structure by exposing it to a greater risk of floods, storm surges, or higher temperatures. Climate change can increase the vulnerability of a resource, ecosystem, or human community, causing a proposed action to result in consequences that are more damaging than prior analysis of environmental impacts might indicate. Climate change could also magnify the damaging strength of certain effects of a proposed action. (CEQ 2010)

The EPA, the US Global Change Research Program (USGCP), and other government and academic groups have been studying the effects of climate change for over 20 years. Information about climate change is available from the EPA on their website (EPA 2013). Similarly, the USGCP makes its findings readily available via its website (USGCP 2013). According to these two sources, in the Great Plains region, the effects of climate change observed to date and projected to occur in the future include, but are not limited to,

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relative measure of how much a GHG is estimated to contribute to global warming relative to CO_2. For example, methane captures solar energy more efficiently than CO_2, so has a GWP of 72 over a 20-year period as compared to a GWP of 1 for CO_2 over the same period. The fluorinated gases are highly efficient at capturing solar energy and also have very long lifespans in the atmosphere, so all have much higher GWP than CO_2. In order to simplify impact assessments, emissions are inventoried and assessed in terms of CO_2 equivalent (CO_2e).

- Increases in average year-round temperatures;
- Increase in average winter temperatures of up to 7°F above historical averages;
- Increases in extreme precipitation events, leading to flooding, increased erosion, and increases in contaminants in the water supply;
- More frequent and more extreme heat events and droughts,
- Increases in average temperatures and extreme heat or drought events have led to;
    - Northward spread of pests;
    - Northward spread in invasive weed species;
    - Decreases in soil moisture and water availability, which may lead to greater wind erosion and airborne particulates;
    - Increased stresses on livestock;
    - Decreased crop reliability;
    - Prairie potholes drying out more frequently, with resulting impacts to waterfowl and other species that rely on those water supplies;
- Increased demand for energy for heating and cooling;
- Increased stress on energy infrastructure from extreme weather events;
- Changing patterns of precipitation and snowmelt, which lead to:
    - Effects to hydropower production;
    - Decreased reliability in traditional water sources;
    - Potential for water shortages.
- Increased risk of disruptions to transportation infrastructure and delays in transportation;
- Impacts to human health related to;
    - Extreme heat, cold, or other extreme weather events;
    - Likely increases in the transmission of some diseases; and
    - Increases in allergic reactions to greater pollen production.

This is not intended to be a comprehensive list, but rather a summary of some of the most important and most noticeable effects of climate change.

4.5.2 Potential Impacts

Direct Impacts

Direct impacts of the Project would include GHG emissions during construction, operation, and decommissioning. GHG emissions from construction equipment and construction vehicle use are expected to be well below the 25,000 metric tons CO_2e per year threshold of potential significance. GHG emissions from decommissioning would be similar. The Project itself will not generate GHG emissions, so GHG emissions during the operational phase would be limited to emissions from occasional maintenance operations. These are expected to be negligible. The Project would therefore not have a meaningful impact in terms of a contribution to climate change.

GHG emissions from a wind farm may be estimated using readily-available life cycle analysis (LCA) figures. An LCA is a cradle-to-grave assessment of the inputs and outputs of resources attributable to wind turbine manufacturing, transport of components and construction equipment, construction of the wind energy facility, operation of the facility, and decommissioning of the facility. Some LCAs factor in the use of recycled metals in manufacturing, recycling of components and materials at the end of the lifespan, and include reasonable expectations for replacement of major components such as blades, gearboxes or generators. A number of independent studies have been published, and several manufacturers including Vestas have completed their own LCAs for specific turbine models

Fripp (2009) compared life cycle and life stage GHG emissions from coal, natural gas and wind power generators. This study provided a summary of 32 primary wind turbine LCAs, and used the ten most recent cases to arrive at a “conservative” average GHG emission rate of 10.7 grams CO_2e per kilowatt-hour of energy produced (g CO_2e/kWh) by wind turbines over the entire lifespan of the wind energy facility. Of that, 10 g CO_2e/kWh (92 percent) is due to construction and decommissioning, and 0.63 g CO_2e/kWh (8 percent) comes during operation of the facilities. Approximately 46 percent of the total lifespan emissions would occur during construction only. Fripp notes that the total emissions rate has decreased as wind turbine technology has improved, allowing fewer turbines – and fewer construction emissions - to produce larger amounts of power. The emissions rate is also influenced by the load factor, or the ratio of the operating hours at nominal power divided by the total hours in a year; greater operating time at nominal wind speeds reduced the lifespan GHG emissions rate.

Based on the conservative GHG emissions rates used by Fripp, and using a conservative 30% load factor and an expected 30 year lifespan, the Proposed Action would result in a total of approximately 8,672.4 metric tons CO_2e produced over the lifespan of the 110 MW facility. Less than half of that would occur during the year of construction and again in the year of decommissioning, and a small portion would occur during operation of the Project. Using this method both the projected total lifespan emissions and the resulting annual emissions of the Project would be well below the 25,000 metric tons per year CO_2e threshold of potential significance established in the 2010 CEQ guidance.

In terms of impacts of climate change to the Project, only a few of the observed and predicted climate change effects directly relate to the function and safety of the Project. More frequent and extreme weather events may cause the wind turbines to automatically shut down for a longer period each year. More extreme precipitation events could affect foundation stability, wash out access roads, or lead to increased erosion and resulting water quality impacts.

None of the known or reasonably expected climate change effects is anticipated to seriously impact the overall function or safety of the Project. Such effects would be mitigated through appropriate design, construction, and operation and maintenance practices. The wind turbines are designed to withstand extreme winds, ice, rains and heat, and incorporate a number of safety features that enable them to do so. These include automated cutoff functions in the event of wind speeds above design maximums, or in the event of ice buildup on the blades. Turbine foundations will be designed and constructed according to accepted engineering practices and with proper drainage to prevent potential instability in the event of severe precipitation events or flooding. Access roads will be designed, constructed, and regularly maintained with appropriate stormwater management features to reduce the likelihood of road damage and water quality degradation in the event of severe precipitation.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would enable them to better withstand severe weather events and additional demands on the transmission system that may be possible as a result of climate change.

Indirect Impacts

As described in the Draft UGP Wind Energy PEIS, the only potentially significant indirect effect of the Project on climate change would be positive; it would result in the reduction of emissions from existing and future thermal power plants. The Draft PEIS estimates that operation of a 50 to 300 MW wind energy facility could result in displacement of about 2.6 percent of CO_2 emissions from electric power systems, and up to 1.8 percent of CO_2 emissions from all source categories in North Dakota alone (see PEIS Table 5.4-2). The Draft PEIS goes on to note, however, that “these emissions offsets would only occur if wind generation actually displaced existing fossil-fueled generation. It is far more likely that any offsets would be of potential future fossil-fueled generation, since wind power would most likely be used to meet growth in generation load needs, and not existing load needs.”

While the specific amount of GHG emissions reduction is difficult to determine, there is little disagreement that some thermal power would be displaced, that this would be larger than the extremely small emissions from construction and operation of the Project, and therefore that the overall indirect impact of the Project to GHG emissions and any resulting climate change would be beneficial.

Avoidance, Minimization and Best Management Practices

Sunflower will implement measures applicable to reducing air quality impacts, as identified in the Draft UGP Wind Energy PEIS (see PEIS section 5.4.2) and listed above in Section 4.4.

Additional site-specific measures may be identified and implemented to further reduce air quality impacts; however, impacts to air quality and climate change are not expected to be significant.

4.6 Water Resources

This section describes Project impacts to groundwater and surface water resources.

4.6.1 Existing Conditions

Surface Water

Surface water in most of the Project Area flows southward to the Heart River, via Spring Creek, Beaver Creek, Heart Butte Creek, Big Muddy Creek and their many unnamed tributaries. Surface water in the northern edge of the Project Area flows northward via several unnamed tributaries to the East Branch Knife River.

As shown in Figure 6, streams and wetlands are present throughout the Project Area. Most streams are intermittent and in many cases function as drainage ways within tilled agricultural fields. There are no known surface water withdrawals for irrigation or other uses within the Project Area. There are no major rivers or traditional navigable waters found within the Project Area.

The Project is located in an area of North Dakota for which flood hazard areas have been mapped by FEMA. Two small areas of mapped 100-year floodplain occur within the western edge of the Project Area along one of the unnamed tributaries to Spring Creek.

Groundwater

Groundwater in the region supplies both public and private wells. Shallow groundwater typically follows local topography, while regional groundwater flow in the deeper bedrock aquifers is generally directed north and east toward Lake Sakakawea and the Missouri River (Trapp and Croft 1975, Ackerman 1980).

Groundwater in Morton and Stark Counties is found in both surficial and bedrock aquifers and is generally plentiful (Trapp and Croft 1975, Ackerman 1980). Review of driller logs available from the North Dakota State Water Commission database indicates that only one well has been drilled within the Project Area, a 438 foot-deep well in Morton County (SE1/4SE1/4-NW1/4, Sec. 20, T139N, R90W), tapping the Tongue River aquifer for stock watering purposes.

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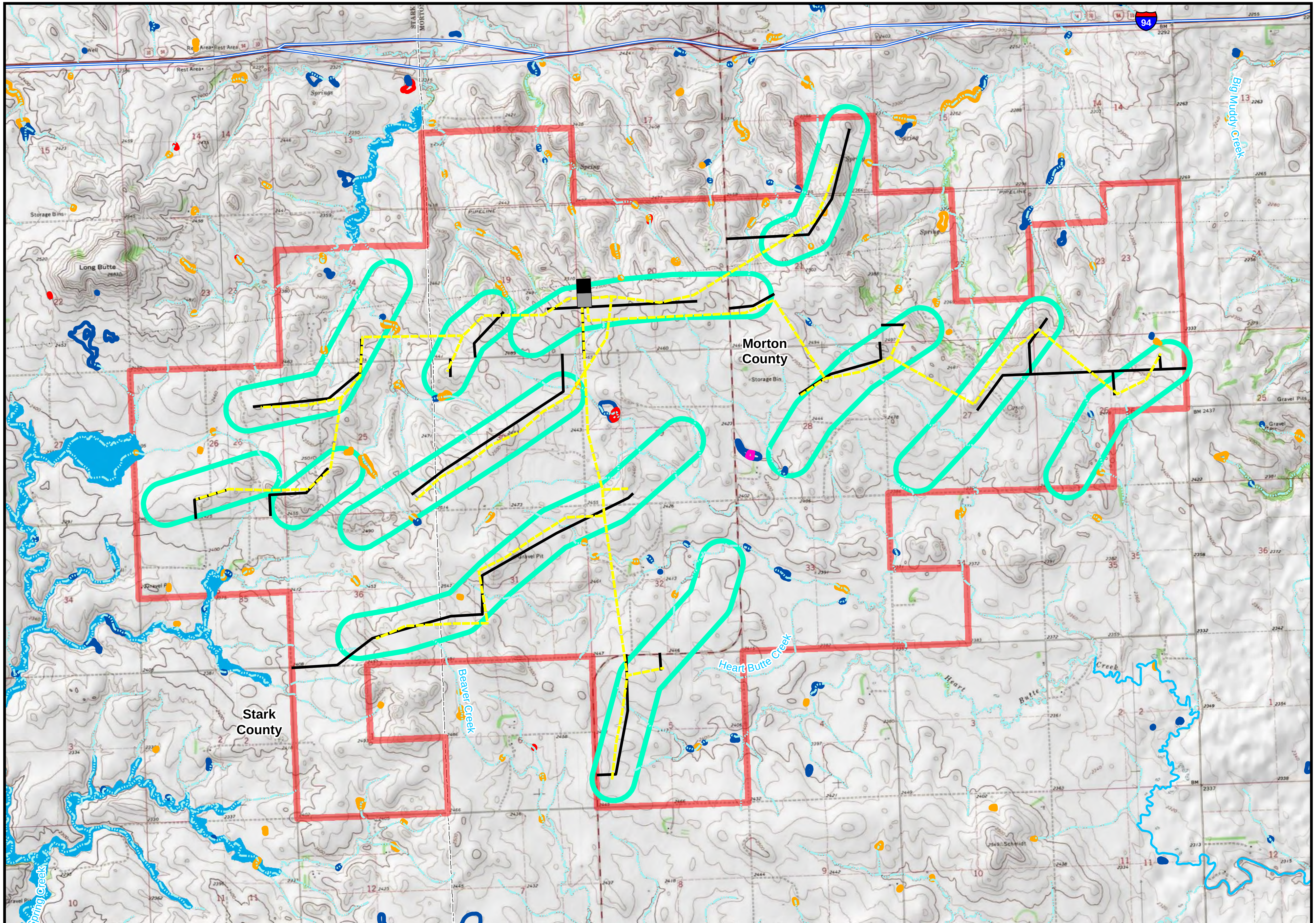
Sunflower Wind Project Environmental Assessment

Figure 6
Surface Waters and Wetlands

Morton and Stark Counties, ND
April 2014



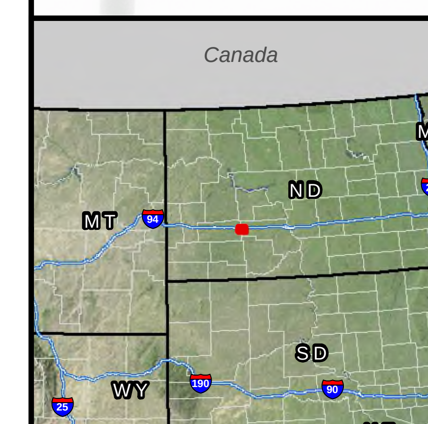
- Project Area
- Preliminary Turbine Array Corridor
- Proposed Interconnection Switchyard
- Proposed Substation
- Approximate Underground Collection System Routing
- Approximate Access Road Routing
- Existing Transmission Line
- County Boundary
- Interstate Highway
- 100 Year Flood Zones

NHD Stream Type

- Perennial Stream
- Intermittent Stream

NWI Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/ Shrub Wetland
- Freshwater Pond
- Other Freshwater Wetland



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4.6.2 Potential Impacts

A significant impact to water resources would occur if 1) the Project causes an increase in susceptibility to on-site or off-site flooding due to altered surface hydrology; 2) the Project causes a violation of the terms and conditions of a NDDoH stormwater permit; 3) the Project causes a loss or degradation of surface water quality in violation of applicable standards; 4) the Project causes a withdrawal or diversion of sufficient volume to adversely affect senior water rights holders; or 5) the Project causes contamination of groundwater resources.

Direct Impacts

The Project would not result in the use of surface water, and there would consequently be no direct or indirect impacts either to water quantity or water quality. The Project would not impact mapped 100-year floodplain areas.

The only permanent use of groundwater would be through a well supplying water to the O&M facility for restroom and cleanup facilities. This well would require a water right permit for Industrial Use pursuant to NDCC 61-04, which would be obtained through an application to the ND State Water Commission. The small amount of groundwater withdrawn would not create a measureable impact to groundwater.

Project construction activities such as excavation and construction of foundations are unlikely to affect groundwater quality or flow patterns. If impacts were to occur, they would likely be minor and highly localized, and unlikely to adversely affect local water supply wells. As the design of the Project is finalized, facilities will be adjusted to avoid impacts to the few existing wells in the area.

Although it appears to be unlikely based on existing conditions, subsurface blasting may be required to excavate for turbine foundations. This could potentially fracture bedrock and affect groundwater flow in the immediate vicinity of the disturbance; however, potential blasting activities would not be deep enough to impact typically used aquifers in the region. In the event that subsurface blasting is required, a blasting plan would be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Potential disturbances due to blasting would be localized and temporary, with groundwater likely to resume its natural course of flow downgradient of the foundation.

Operation of the Project would involve periodic changing of lubricating fluids for the turbines, and may involve small quantities of hazardous materials to be kept and used onsite (e.g., herbicides used for noxious weed management). These materials will be managed according to the conservation measures described in the Draft UGP Wind Energy PEIS, which would prevent their release into surface or groundwater in the Project Area, as listed below.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no impacts on ground or surface waters. This work would utilize existing access roads and other previously-disturbed areas, so no new impacts to surface waters or wetlands would occur. This work would not require water, either for construction or operation, beyond a minimal amount used for dust control at active work sites. Dust control water would be obtained from an authorized source, such as a municipal supplier with adequate water rights, so this work would not adversely impact existing water rights or supplies.

Indirect Impacts

Neither action alternative would create indirect impacts to ground or surface water.

Avoidance, Minimization and Best Management Practices

Sunflower will implement measures to avoid or minimize impacts to water resources, as identified in the Draft UGP Wind Energy PEIS; applicable measures are found in the sections on Water Resources and Hazardous Materials (PEIS sections 5.3.2 and 5.12.1.4 respectively). Measures related to Hazardous Materials are listed above in Section 4.3.

Conservation measures related to Water Resources are as follows:

- Minimize the extent of land disturbance to the extent possible.
- Use existing roads and disturbed areas to the extent possible.
- Site new roads to avoid crossing streams and wetlands and minimize the number of drainage bottom crossings.
- Apply standard erosion control BMPs to all construction activities and disturbed areas (e.g., sediment traps, water barriers, erosion control matting) as applicable to minimize erosion and protect water quality.
- Apply erosion controls relative to possible soil erosion from vehicular traffic.
- Identify and avoid unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, high slope angles, and certain geologic landforms).
- Identify areas of groundwater recharge and discharge and evaluate their potential relationship with surface water bodies and groundwater quality.
- Avoid creating hydrologic conduits between two aquifers (e.g., upper and lower).
- Construct drainage ditches only where necessary; use appropriate structures at culvert outlets to prevent erosion.
- Avoid altering existing drainage systems, especially in sensitive areas such as erodible soils or steep slopes.
- Clean and maintain catch basins, drainage ditches, and culverts regularly.
- Limit herbicide and pesticide use to nonpersistent, immobile compounds and apply them using a properly licensed applicator in accordance with label requirements.
- Dispose of excess excavation materials in approved areas to control erosion and minimize leaching of hazardous materials.
- Reestablish the original grade and drainage pattern to the extent practicable.
- Reseed (non-cropland) disturbed areas with a native seed mix and revegetate disturbed areas immediately following construction.
- When decommissioning sites, ensure that any wells are properly filled and capped.

Additional site-specific measures to further reduce impacts to water resources may be identified and implemented as appropriate; however, impacts to water resources are not expected to be significant.

4.7 Wetlands and Other Jurisdictional Waters

Waters of the United States include wetlands and streams which meet the definitions in 33 CFR Part 328; such waters are regulated by the US Army Corps of Engineers (USACE) under the Clean Water Act (CWA). Section 404 of the CWA, regulation of discharge of dredge/fill materials, is implemented by the USACE. A CWA Section 404 permit will be required only if the Project will permanently impact wetlands or other jurisdictional waters of the United States. The 404 permit is issued by the U.S. Army Corps of Engineers (USACE).

The CWA includes provisions for both individual and nationwide permits. If the Project impacts are larger than 0.5 acre of wetlands or 300 linear feet of stream bank, USACE would require an Individual Permit, which requires development of a formal mitigation plan. The district engineer may waive the 300-linear-foot limit for intermittent or ephemeral streams by making a written determination that the discharge will result in minimal individual and cumulative adverse effects. Individual permits require state water quality certification under CWA Section 401.

Nationwide permits are issued by the USACE under CWA Section 404 for projects expected to have minimal individual or cumulative effects. They do not require a mitigation plan and are pre-certified under CWA Section 401. Impacts of the Project to wetlands and streams that are less than the threshold limits for individual permits would be permitted under Nationwide Permit (NWP) Program 51 for renewable energy programs including wind power projects.

4.7.1 Existing Conditions

A preliminary assessment of the presence of potentially jurisdictional waters was performed using available desktop data including the National Wetlands Inventory (NWI) and National Hydrologic Data (NHD) data sets and high-resolution aerial photography. The use of aerial photography is appropriate for the Project Area since the area contains little tree cover and the boundaries of wetlands and streams are generally evident.

This preliminary assessment was used as a guide for avoidance and minimization, and to determine potential impacts of the Project. NHD and NWI data is not definitive as to classifications and existence of features, and any potentially jurisdictional water or wetland that would actually be impacted by the Project will be delineated, and a preliminary jurisdictional determination made, prior to construction.

Figure 6 shows the locations of wetlands and streams within the Project Area; these waters are scattered and relatively sparse. Wetlands are usually surrounded by tilled fields or pasture.

4.7.2 Potential Impacts

A significant impact to water wetlands or other jurisdictional waters would occur if the Project would create a loss or degradation of such resources in violation of a USACE permit.

It is Sunflower's intention to avoid all impacts to wetlands, regardless of jurisdictional status. As the Project layout is finalized, the specific location and configuration of access roads, turbine foundations and temporary construction areas, the Project substation and interconnection switchyard, the O&M facility, and the construction staging area will be adjusted to avoid all impacts to wetlands, and to avoid impacts to streams to the extent practicable. The implementation of these practices will enable Sunflower to avoid all impacts to wetlands, and to minimize impacts to streams such that either no permit would be required or the Project would qualify for a Nationwide Permit.

Some Project infrastructure, specifically electrical collector lines and access roads, cannot be designed to completely avoid streams. However, electrical collection lines would cross under streams using HDD, avoiding impacts to the streams at these locations. Access road stream crossings will be avoided if possible, and impacts at remaining necessary stream crossings would be minimized by reducing roadway widths to the extent feasible. Preliminary collection line and access road stream crossing locations are shown on Figure 6. A typical access road stream crossing is shown in Figure 7. Typical collection line drilled stream crossing is shown in Figure 8.

Direct Impacts

The only potential direct impact to jurisdictional waters would be the crossing of potentially jurisdictional streams by access roads. The Project is estimated to require approximately 14 access road crossings of potentially intermittent streams.

Based on the assumption of a 16 foot-wide permanent access road, the Proposed Action would result in a total of up to 224 linear feet of permanent impacts to intermittent streams. The total amount of impacts is estimated to be lower than the 300 linear foot threshold limit for an Individual Permit, indicating that these impacts can be permitted through the issuance of a Nationwide Permit. This estimate is considered conservative and adjustments to the Project are expected to further reduce the total impacts to streams.

Avoidance measures and compliance with the terms of the 404 permit would reduce the impacts of the Project to jurisdictional waters to a level of non-significance.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission line would have no impacts to wetlands. This work would utilize existing access roads and other previously-disturbed areas, so no new impacts to wetlands would occur.

Indirect Impacts

Indirect impacts could include impacts to water quality due to erosion and sedimentation, contamination of waters, or changes to local hydrology that would alter wetland conditions. Erosion and sedimentation would be limited through the implementation of appropriate stormwater management best management practices. These will be defined in the Project Erosion and Sediment Control Plan (ESCP), which is an integral part of the required NPDES Construction Stormwater Permit. Stormwater would be managed to infiltrate onsite, and would not be directed to flow into wetlands or natural streams. In addition, appropriate engineering design of access road stream crossings, and proper maintenance of those roads, would limit water quality impacts at those crossings. Crossings would be designed to prevent changes to local hydrologic conditions and allow for free flow of streams.

Prevention of water contamination will be addressed through the implementation of appropriate hazardous materials handling procedures during construction, operation, and decommissioning of the Project. This will include the measures included in the Draft UGP Wind Energy PEIS as listed below. Key requirements include fueling or maintaining vehicles and construction equipment a sufficient distance from wetlands or streams; storing any necessary hazardous materials far from streams or wetlands, implementing proper handling controls, and implementing robust spill response procedures.

Avoidance, Minimization and Best Management Practices

In addition to the measures discussed above, Sunflower will implement the measures to avoid or minimize impacts to jurisdictional waters and wetlands identified in the Draft UGP Wind Energy PEIS; applicable measures are found in the sections on Water Resources and Hazardous Materials (PEIS sections 5.3.2 and 5.12.1.4 respectively), which are listed above in Sections 4.3 and 4.6. Additional measures are provided the Draft PEIS section on Aquatic Biota and Habitats (PEIS section 5.6.2), which are listed in Section 4.9 of this EA.

Additional site-specific measures to further reduce impacts to waters and wetlands may be identified and implemented as appropriate; however, impacts to waters and wetlands are not expected to be significant.

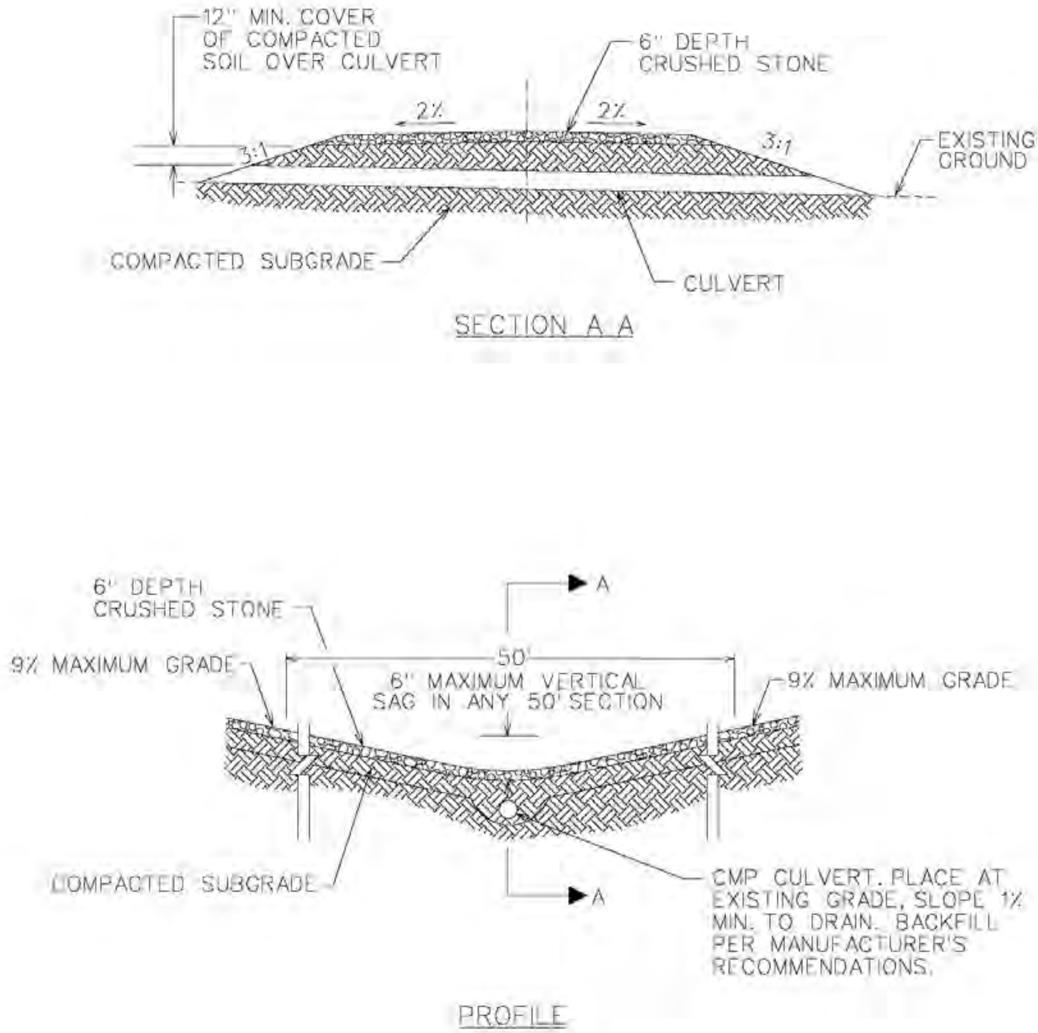

Figure 7. Typical Access Road Stream Crossing

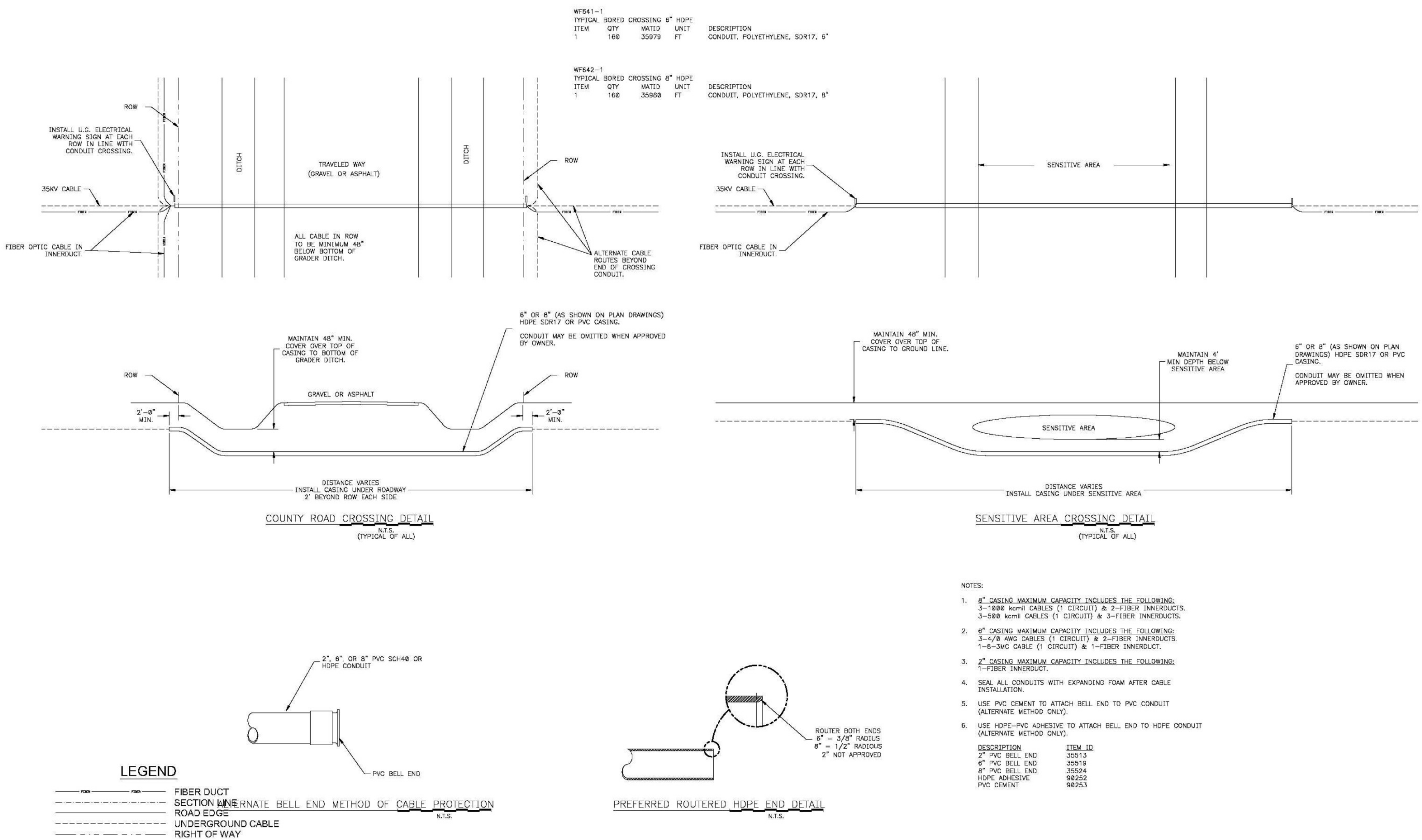

Figure 8. Typical Collector Line Drilled Stream Crossing

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4.8 Vegetation

4.8.1 Existing Conditions

Vegetation Communities

Vegetation within the Project Area includes crops interspersed with rangeland made up of fallow parcels or grassland. Typical crops include wheat, hay, barley, oats, and corn. In steeper terrain the primary land cover is grassland. Scattered areas may be classified as native prairie (areas of naturally occurring grasses and forbs) (USGS 2013). Riparian areas contain shrubs and small trees. Wetland basins are common, most are less than five acres and support seasonal surface water.

The vegetation communities within the Project Area were described using available desktop information and current aerial photography in spring 2013 (see Appendix C, WEST Habitat Mapping Memo). These communities are shown in Figure 9 and Table 5.

Table 5. Mapped Vegetation Communities in the Project Area

Vegetation Community	Total (Acres)	Percentage of Survey Area
Cropland	12,940	28.9
Grassland	8,324	37.9
Developed	485	2.2
NWI Wetlands	110	0.5
Deciduous Trees	102.5	0.5
Shrubs	17	0.1
Unknown Trees	3	<0.1
Water	1	<0.1
Total	21,983	100%

The Study Area for vegetation cover was slightly different than the Project Area; however, review of aerial photos and on site reconnaissance indicates that the vegetation communities are similar throughout the area and the percentages of each vegetation community presented in this table are very likely representative.
Values over 1 acre are rounded to the nearest acre.

Noxious and Invasive Weeds

North Dakota has listed twelve species which are considered noxious weeds (NDCC 63-01.1). The Stark County Weed Board lists two additional weed species (black henbane and hoary cress); Morton County does not list additional noxious weed species (NDDA 2013a).

The North Dakota Weed Mapper (NDDA 2013b) indicates that Canada thistle is present along many of the roads within and surrounding the Project Area. None of the other state or county listed weeds are known to be present.

Rare Plant Populations

There are no federal listed, proposed, or candidate species known to occur in Stark or Morton counties. North Dakota does not have a state endangered or threatened species list. North Dakota's list of Species of Conservation Priority includes only one plant, the western prairie fringed orchid, which is not known to occur in Stark and Morton counties.

4.8.2 Potential Impacts

A significant impact to vegetation resources would occur if the Project resulted in: 1) a loss of habitat resulting in the listing of or an adverse impact on the continued existence of plant or animal species; 2) uncontrolled expansion of noxious weeds; or 3) the removal of habitat important to the continued survival and reproduction of wildlife species.

Direct Impacts

The Project would result in direct, permanent impacts to vegetation communities through the establishment of turbine foundations, access roads, and the substation, interconnection switchyard and O&M facility. The Project would result in temporary impacts at the construction laydown area, the portions of Project access roads used for construction and then reclaimed, and temporary construction areas surrounding each turbine.

The Proposed Action would create approximately 45 acres of permanent impact and 251 acres of temporary impact. These impacts would be distributed between cropland and grassland, with extremely small impact to developed area (existing roads), and no impacts to wetlands, trees, shrubs or water.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no impacts to native grassland or other sensitive vegetation communities. This work would utilize existing access roads and other previously-disturbed areas, so no new impacts to sensitive vegetation communities would occur.

Indirect Impacts

The Project would not create indirect impacts to vegetation communities.

Avoidance, Minimization and Best Management Practices

Sunflower will continue to avoid and minimize impacts to prairie and riparian habitats during the final design process. Remnant native prairie may be present at scattered locations throughout the Project Area. During final design Sunflower will use the aerial photography and the results of further on-site investigations to locate turbines, access roads and collection lines on previously disturbed land to the maximum extent practical.

Sunflower will implement measures to avoid or minimize impacts to sensitive habitats and measures to control the spread of invasive species as identified in the Draft UGP Wind Energy PEIS (see Section 5.6.2), as follows:

- Minimize the size of areas in which soil would be disturbed or vegetation would be removed.
- Reduce habitat disturbance by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.
- Initiate habitat restoration of disturbed soils and vegetation as soon as possible after construction activities are completed. Restore areas of disturbed soil using weed-free native grasses, forbs, and shrubs, in consultation with land managers and appropriate agencies such as State or County extension offices or weed boards.
- Develop a plan for control of noxious weeds and invasive plants that could occur as a result of new surface disturbance activities at the site. The plan should address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations. Require the use of certified weed-free mulching.
- Establish a controlled inspection and cleaning area for trucks and construction equipment arriving from locations with known invasive vegetation problems. Visually inspect construction equipment arriving at the project area and remove and contain seeds that may be adhering to tires and other equipment surfaces.
- Regularly monitor access roads and newly established utility and transmission line corridors for the establishment of invasive species. Initiate weed control measures immediately upon evidence of the introduction or establishment of invasive species.
- Do not use fill materials that originate from areas with known invasive vegetation problems.
- Access roads, utility and transmission line corridors, and tower site areas should be monitored regularly for the establishment of invasive species, and weed control measures should be initiated immediately upon evidence of the introduction of invasive species.
- Regularly inspect access roads, utility and transmission line corridors, and tower site areas for damage from erosion, washouts, and rutting. Initiate corrective measures immediately upon evidence of damage.
- Salvage and reapply topsoil excavated during decommissioning activities to disturbed areas during final restoration activities.
- Reclaim areas of disturbed soil using weed-free native shrubs, grasses, and forbs. Restore the vegetation cover, composition, and diversity to values commensurate with the ecological setting.

Introduction of noxious weeds will be mitigated through prompt revegetation with native species or restoration of prior land use, and through ongoing monitoring and control programs. Additional site-specific measures to further reduce impacts to wildlife may be identified and implemented as appropriate; however, impacts to wildlife are not expected to be significant.

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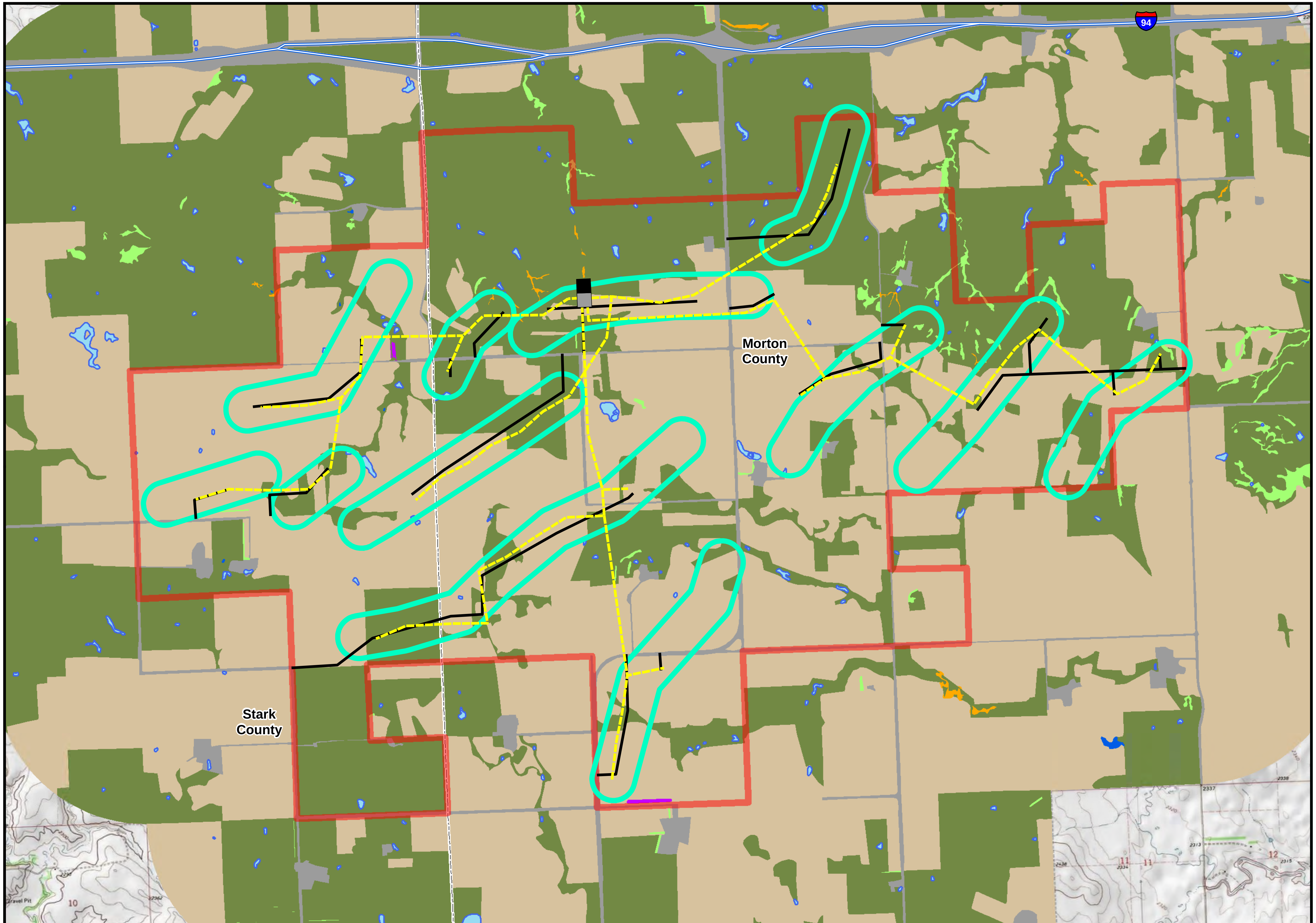
Sunflower Wind Project Environmental Assessment

Figure 9
Land Cover

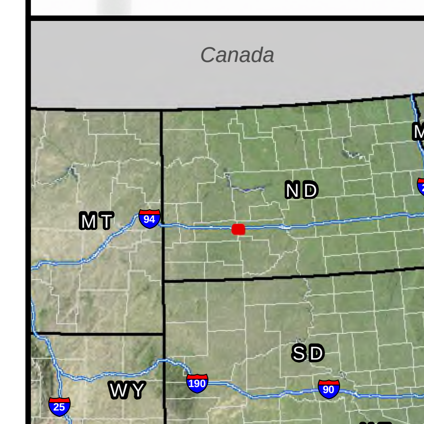
Morton and Stark Counties, ND
April 2014



- Project Area
- Preliminary Turbine Array Corridor
- Proposed Interconnection Switchyard
- Proposed Substation
- Approximate Underground Collection System Routing
- Approximate Access Road Routing
- County Boundary
- Interstate Highway

WEST Land Cover

- NWI wetland
- Crop
- Deciduous Trees
- Developed
- Grass
- Shrubs
- Trees
- Water



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4.9 Wildlife

This section describes the wildlife resources in the Project Area and potential Project impacts.

Although the evaluation of wildlife resources focuses on the Project Area (Figure 2), some discussion of impacts at a regional scale is included in order to evaluate potential impacts to highly mobile wildlife such as migratory birds. Existing literature and other information related to known species distributions, including endangered, threatened, proposed, candidate, and sensitive species; migration pathways; and wetlands and unique habitats within the Project Area, were reviewed for relevance. Federal and state threatened, endangered, proposed and candidate species are addressed in Section 4.10; this section addresses non-listed wildlife, including Birds of Conservation Concern and North Dakota Species of Conservation Priority.

4.9.1 Data Sources

Sunflower used available on-line data sources for initial characterization of the wildlife resources in the Project Area; these are discussed in Appendix C. Sunflower conducted the following field surveys to document wildlife use of the Project Area:

- Raptor nest survey,
- Avian point count surveys (spring, summer, fall and winter),
- Bat acoustic monitoring,
- Grouse lek surveys, and
- Whooping crane stopover evaluation.

A copy of each of these survey reports is provided in Appendix D.

The survey protocols that were utilized for field surveys that have been completed for the Project were developed based on the USFWS's Wind Energy Guidelines (USFWS 2012) and based on recommendations from the USFWS North Dakota Field Office. Incidental observations were recorded for terrestrial species during the avian point count surveys. The Study Area for these surveys covered approximately 22,000 acres, and varied slightly from the Project Area. However, the Study Area is considered representative of the Project Area, as review of aerial photos and on site reconnaissance indicated that the vegetation communities are similar throughout the area, and thus wildlife use is similar to the Study Area. Lek, raptor nest, and eagle nest surveys included 0.5-mile, 1-mile, and 10-mile buffers on this Study Area. The results of these surveys are reported below. Survey methods and results are presented in Appendix C.

4.9.2 Existing Conditions

Wildlife species observed within the Project Area are typical of agricultural, grassland, woodland, and wetland habitats.

Raptor Nests

For the purposes of the Project, raptors are defined as kites, accipiters, buteos, harriers, eagles, falcons, and owls. Surveys for nests of all raptor species included the Study Area plus a 1-mile buffer. Aerial surveys, including for eagle nests, were carried out in accordance with guidance provided in the USFWS Inventory and Monitoring Protocols (Pagel et al. 2010). Eagle surveys included the Study Area plus a 10-mile buffer because the USFWS defines the area nesting population for golden eagle to be the “number of pairs of golden eagles known to have a nesting attempt during the preceding 12 months within a 10-mile radius of a golden eagle nest” (USFWS 2013e). Golden eagles are not present; however this EA uses the same approach for bald eagles.

Eighteen raptor nests representing five species were documented within the Study Area and associated buffers during the 2013 aerial survey spring and summer ground-based avian point count surveys (Table 7). During the surveys two buffers were surveyed. No eagle nests were recorded within the Study Area or the 1-mile buffer. Five bald eagle nests (1 active and 4 inactive/unoccupied) were recorded within the 10-mile buffer. At the time this EA was written, the Project Area had shifted from when surveys were conducted, which resulted in inventoried nests being located more than 10 miles from the Project Area; these nests are presented in the EA for completeness.

The closest bald eagle nest to the Project was located along Haymarsh Creek, approximately 7.5 miles northeast of the Project Area; this nest was unoccupied at the time of surveys. The one active bald eagle nest observed was located along the Heart River, approximately 10.8 miles south of the Project Area. Based on these distances there is potential that important use areas for bald eagles may exist within 10 miles of the Project.

Of the 13 other raptor nests identified, 4 were within the Project Area. All four of these nests were occupied at the time of the survey (Table 6). Nests belonging to three Species of Conservation Priority were documented: bald eagle, Swainson’s hawk, and burrowing owl. Of these species, bald eagle and burrowing owl are also Birds of Conservation Concern.

Table 6. Raptor Nest Status and Distance to the Project Area

Nest ID[/a]	Species	Nest Status	Distance to Project Area (mi) [/b]
BAEA_Nest4	Bald eagle	Occupied, active	10.8 [/c]
BAEA_Nest1	Potential bald eagle	Unoccupied, inactive	7.5
BAEA_Nest2	Potential bald eagle	Unoccupied, inactive	8.6
BAEA_Nest3	Potential bald eagle	Unoccupied, inactive	9.8
BAEA_Nest5	Potential bald eagle	Unoccupied, inactive	11.3 [/c]
SF-9	Burrowing owl	Occupied, active	Within
SF-5	Great horned owl	Occupied, active	Within
SF-1	Great horned owl	Occupied, active	0.5
SF-2	Great horned owl	Occupied, active	0.5
SF-8	Red-tailed hawk	Occupied, active	Within
SF-6	Red-tailed hawk	Occupied, active	0.5
SF-11	Red-tailed hawk	Occupied, active	0.1
SF-3	Swainson's hawk	Occupied, active	Within
SF-7	Swainson's hawk	Occupied, active	1.0
SF-13	Swainson's hawk	Occupied, active	0.5
SF-12	Unknown raptor	Occupied, active	0.5
SF-4	Unknown raptor	Unoccupied, inactive	0.5
SF-10	Unknown raptor	Unoccupied, inactive	0.4

/a Nest IDs as assigned in WEST Raptor Nest Survey Report (Appendix C)
/b distances are approximate.
/c Boundary changes resulted in greater than 10 miles from the Project Area but presented here for completeness.

Avian Use

Sunflower contracted WEST to conduct fixed-point avian surveys in 2013 to estimate seasonal and spatial use of the study area by birds in order to identify potential avian impacts associated with construction and operation of the Project. The surveyors also recorded incidental wildlife observations to document birds detected outside of the standardized surveys. Birds observed incidentally were excluded from avian use calculations.

Sixty-eight unique bird species were identified during spring and summer 2013 point count surveys and incidentally. No federally endangered, threatened or candidate species were recorded. Nine Birds of Conservation Concern were recorded, and sixteen North Dakota Species of Conservation Priority were recorded, including two bald eagles. North Dakota Species of Conservation Priority are discussed below under State Species of Conservation Priority.

Passerines were the most abundant bird type observed, accounting for 84.2% of all observations. Waterbirds, represented almost entirely by sandhill cranes (*Grus canadensis;* 350 observations), were the second most abundant bird type observed in the study area, representing 6.1% of all observations. A total of 79 diurnal raptors were observed, accounting for 1.4% of all individuals recorded. Northern harrier (*Circus cyaneus*) and Swainson's hawk

(*Buteo swainsoni*) were the most commonly observed raptor species (20 and 19 individuals, respectively). Two individual bald eagles (*Haliaeetus leucocephalus*) were observed in the spring. No listed or candidate avian species were observed.

Species diversity of birds observed reflected the grassland and agricultural habitat within the Study Area. Species of open grassland habitats were dominant, but species that utilize woodlands and wetlands were also observed interspersed throughout the Study Area.

A far greater number of bird observations occurred in the spring season (5,338) compared to summer (454). Although the spring season had almost twice as many surveys conducted, it is unlikely that doubling the number of surveys in summer would have resulted in the total number of birds observed to approach those recorded in spring. Lapland longspur and common redpoll had the highest number of individuals recorded and were only observed in the spring. In total, 26 bird species were recorded in spring that were not recorded in the summer, while only four species were observed in the summer that were not recorded in the spring. Overall, diurnal raptors were also more common in the spring; birds observed during the spring likely included migrating individuals.

Grouse Leks

Sunflower contracted WEST to conduct sharp-tailed grouse lek aerial surveys in April and May 2013, in order to determine the approximate location of sharp-tailed grouse leks and provide general information on sharp-tailed grouse use within and immediately adjacent to the Project Area during peak lekking activity (early April through mid-May). Eight confirmed (birds observed in courtship behavior at the same location during more than one survey) and five possible (birds observed in courtship behavior during only one survey) leks were recorded.

Five of the confirmed leks and two of the possible leks were identified within the Project Area. The three additional confirmed leks that are outside of the Project Area are approximately 0.25 miles to the north, and 1.5 miles and 2.5 miles to the south. Three additional potential lek sites were identified outside the Project Area. The maximum number of sharp-tailed grouse recorded on leks ranged from 7 to 30 (Table 7).

Table 7. Sharp-tailed Grouse Lek Status and Distance to Project Area

Lek ID	Lek Status	Maximum number of individuals	Distance to Project Area (mi)
1	confirmed	21	Within
2	possible	12	0.5
3	possible	14	Within
4	possible	8	1
5	confirmed	8	0.25
6	confirmed	9	Within
7	confirmed	18	2.5
8	confirmed	16	Within
9	possible	7	Within
10	confirmed	25	Within
11	confirmed	29	1.5
12	confirmed	30	Within
13	possible	18	0.8

Bats

Of the 47 bat species in the United States, ten occur in North Dakota and may potentially occur within the Project Area based on current known distribution ranges, including the little brown bat (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), western long-eared myotis (*M. evotis*), western small-footed myotis (*M. ciliolabrum*), Keen's myotis (*M. keenii*), northern long-eared myotis (*M. septentrionalis*) and long-legged myotis (*M. volans*) (ASM 2007, NatureServe 2008, BCI 2009). None of the species that potentially occur within the Project Area are federally listed as threatened or endangered. Three of the species that could potentially occur within the Project Area – hoary bat, silver-haired bat, and eastern red bat – are highly migratory and are found in the greatest abundance in North Dakota during late May through early September (Cryan 2003).

Sunflower contracted WEST to complete a study of bat activity during summer and fall 2013 (see report in Appendix C). Acoustic monitoring surveys were conducted at three meteorological tower stations within the Project Area between June 12 and October 23, 2013. Three ground-based AnaBat detectors were used to record bat activity; one of these was paired with another elevated AnaBat detector placed at approximately 148 feet (45 meters) above ground level to record bats flying near rotor heights. The detectors were programmed to start recording approximately 30 minutes before sunset and turn off approximately 30 minutes after sunset each night.

The standard metric used for measuring bat activity was the number of bat passes per detector-night, and this metric was used as an index of bat activity in the Project Area. To assess potential for bat fatalities, bat activity in the Project Area was compared to existing data at other wind energy facilities in the Midwest.

Bat activity was consistently higher – nearly twice as high on average – at the ground-based detectors than at the elevated detector. Research suggests that bat activity in the rotor-swept heights may be more representative of bat exposure to turbines and potential fatalities. Because bat activity was generally lower at the raised met tower station than ground level stations, there may be a lower potential risk of collision with turbines than if the call rates were similar at both the ground and at the raised station. Bat activity was relatively low in the summer and higher in the fall, peaking from August 4 to August 10, and steadily decreasing thereafter. Most bat fatality studies at wind energy facilities in the US have shown a peak in fatalities in August and September (the fall migration period) and generally lower mortality earlier in the summer and very low mortality during the spring.

Bat activity recorded by ground detectors at met towers during the fall migration period (1.70 ± 0.20 bat passes per detector-night) was the lowest activity when compared to all publicly-available reports from wind energy facilities in Midwest, and the third lowest when compared to all facilities in North America with similarly-collected activity data, potentially indicating low direct impacts to bats.

Other Wildlife Species

During spring and summer 2013 surveys for the Project, surveyors recorded incidental wildlife observations. Non-avian wildlife observed included coyotes, mule deer, porcupines, pronghorn, thirteen-lined ground squirrels, a white-tailed jackrabbit, and western chorus frogs.

Birds of Conservation Concern

The Project Area is located in USFWS Bird Conservation Region (BCR) 17 (Badlands and Prairies). The USFWS has compiled a list of bird species that represent the highest conservation priority and without which conservation actions are likely to become candidates for listing under the ESA. Table 8 lists Birds of Conservation Concern that were observed during surveys (WEST 2013 Appendix C).

Table 8. Birds of Conservation Concern

Common Name	Scientific Name	Habitat Type	Habitat Details
Bald Eagle	*Haliaeetus leucocephalus*	Forest and Wetland	Lots of trees with abundant water such as streams and lakes.
Prairie Falcon	*Falco mexicanus*	Native Prairie/ Canyons/Mountains	Occupy treeless open terrain. Nests in foothills and mountains with cliffs and escarpment.
Upland Sandpiper	*Bartramia longicauda*	Native Prairie/ Grassland	Inhabit mixed-grass prairie, local extensive tracts of wet meadow, grazed tall-grass prairie, tame haylands, CRP fields, and mowed or burned railroad or highway rights-of-way.
Marbled Godwit	*Limosa fedoa*	Wetlands	Breeds on grassy plains, wet meadows and vegetated sloughs, near rivers and streams.
Burrowing Owl	*Athene cunicularia*	Native Prairie/ Grassland	Prefer open areas within grasslands where soils are well drained with sparse vegetation.
Short-eared Owl	*Asio flammeus*	Grassland	Require open areas with dense herbaceous covering for nesting.
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Grassland/Forest	Inhabits open woodland, parks, gardens, edges and clearings near forests, and cultivated areas.
Loggerhead Shrike	*Lanius ludovicianus*	Grassland	Prefer open habitat comprised of grasses and forms with bare ground and low shrubs.
Grasshopper Sparrow	*Ammodramus savannarum*	Grassland	Found in prairies, pastures and hay fields.
Source: BCC 2008			

The USFWS list of Birds of Conservation Concern includes the Sprague's pipit which is a federal candidate species. This species is discussed below in the Section 4.10; however, this species was not detected during surveys. All of the Birds of Conservation Concern species observed during surveys are also State Species of Conservation Priority (see Tables 8 and 9).

State Species of Conservation Priority

The NDGFD has identified 100 species of conservation priority, or those in greatest need of conservation in the state (NDGFD 2008). These species are categorized into three levels according to the need for conservation:

- Level I - Species in greatest need of conservation
- Level II - Species in need of conservation, but have had support from other wildlife programs
- Level III - Species in moderate need of conservation, but are believed to be on the edge of their range in North Dakota

Table 9 shows Level I species that have been documented in the Missouri Slope Region including Stark and Morton Counties.

Table 9. Species of Conservation Priority Level I in the Missouri Slope Region

Common Name	Scientific Name	Habitat Type	Habitat Details
Swainson's Hawk	*Buteo swainsoni*	Native Prairie/ Grassland/Forests	Require native prairie or cropland that includes thickets of natural tree growth, brush margins of native forested tracts or shelterbelts.
Ferruginous Hawk	*Buteo regalis*	Native Prairie	Confined to very limited areas of native prairie, usually those with hilly terrain or with low-grade topsoil that has not been altered by the plow or lower quality from overgrazing.
Upland Sandpiper	*Bartramia longicauda*	Native Prairie/ Grassland	Inhabit mixed-grass prairie, local extensive tracts of wet meadow, grazed tall-grass prairie, tame haylands, CRP fields, and mowed or burned railroad or highway rights-of-way.
Long-billed Curlew	*Numerius americanus*	Native Prairie/ Grassland	Inhabit dry, native grasslands.
Wilson's Phalarope	*Phalaropus tricolor*	Wetland	Found in swales along ephemeral streams and various types of ponds and lakes that contain expanses of shallow water that are interspersed with, or adjacent to, wet-meadow vegetation.
Sprague's Pipit	*Anthus spragueii*	Native Prairie	Prefer native medium to intermediate height prairie. In short grass prairie landscape, can often be found in areas with taller grasses. More abundant in native prairie than in exotic vegetation. Requires relatively large areas of appropriate habitat.
Grasshopper Sparrow	*Ammodramus savannarum*	Native Prairie	Prefer open prairies with intermittent brush, avoids heavy brush cover.
Baird's Sparrow	*Ammodramus bairdii*	Native Prairie /Grassland	Inhabit native prairie; structure may be more important than plant species composition. Nesting may take place in tame grasses (found in Crested Wheat, while avoids Smooth Brome). Areas with little to no grazing activity are required.
Lark Bunting	*Calamospiza melanocorys*	Native Prairie/ Grassland	Found in short-grass & mixed-grass communities as well as fallow fields, roadsides, and hayfields.
Chestnut-collared Longspur	*Calcarius ornatus*	Native Prairie/ Grassland	Located in tracts of heavily grazed or hayed mixed-grass prairie or mixed-grass/short-grass prairie.
Plains Spadefoot	*Spea bombifrons*	Native Prairie/ Grassland/Cropland	Found in the dry prairies, sagebrush communities, and farm fields.
Western Hognose Snake	*Heterodon nasicus*	Native Prairie	Prefer sandy or gravelly habitats like sand prairies, very open portions of prairies, or sand dunes with very little cover.
Black-tailed Prairie Dog	*Cynomys ludovicianus*	Native Prairie/ Grassland	Require short-grass prairie habitats. They avoid heavy brush and tall grass areas due to the reduced visibility these habitats impose.

North Dakota's list of Species of Conservation Priority includes five species that are also listed as federally threatened or endangered: the interior least tern, piping plover, pallid sturgeon, whooping crane and gray wolf. These species are discussed below in Section 4.10.

In a letter dated September 19, 2013 (see Appendix B), the NDGFD did not list particular species of concern that may be found in the Project Area; rather, the agency noted that disturbance of native prairie and wetlands are of primary concern with regard to wind energy development.

In WEST's Wildlife Surveys Report (see Appendix C), 16 North Dakota Species of Conservation Priority were observed in or near the Project Area. These included 6 Level I species and 10 Level II species (Table 10).

Table 10. Species of Conservation Priority Observed During 2013 Wildlife Surveys

Common Name	Scientific Name	Conservation Priority Level
sharp-tailed grouse	*Tympanuchus phasianellus*	2
northern harrier	*Circus cyaneus*	2
Swainson's hawk	*Buteo swainsoni*	1
bobolink	*Dolichonyx oryzivorus*	2
upland sandpiper	*Bartramia longicauda*	1
willet	*Catoptrophorus semipalmatus*	1
burrowing owl	*Athene cunicularia*	2
lark bunting	*Calamospiza melanocorys*	1
northern pintail	*Anas acuta*	2
grasshopper sparrow	*Ammodramus savannarum*	1
marbled godwit	*Limosa fedoa*	1
loggerhead shrike	*Lanius ludovicianus*	2
bald eagle	*Haliaeetus leucocephalus*	2
redhead	*Aythya americana*	2
prairie falcon	*Falco mexicanus*	2
red-headed woodpecker	*Melanerpes erythrocephalus*	2

WEST identified three Swainson's hawk nests during surveys in spring 2013. One is located within the Project Area, and the other two are 0.5 and 1 mile from the Project Area (see Appendix C).

4.9.3 Potential Impacts

Direct Impacts

Direct permanent effects include mortality or injury due to collisions with turbines, guy wires, or transmission lines and mortality of ground and shrub nesting birds and possibly nests by construction vehicles and ground clearing activities. The reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines for the Project will not increase potential impact to wildlife species discussed in this EA, as these transmission lines are already present and reconductoring would not significantly alter their design.

Direct temporary effects to birds may include temporary displacement from the construction area due to construction noise and activity. Construction noise and activity may result in a reduction in nesting activity in the immediate vicinity, and construction could result in the temporary loss of nests of ground-nesting species.

Raptors

Eighteen raptor nests representing five species were documented during 2013 surveys, of which 5 were bald eagle nests. Four raptor nests were located in the Project Area, although none were eagle nests. Two observations of bald eagles flying through the area confirm the potential utilization of the area by bald eagles; however, the probability of mortality with Project facilities is low. Mean raptor use in the Project area in spring and summer is 0.53 and 0.35 raptors/plot/20-min survey, respectively (WEST 2013). When compared to other wind energy facilities, the mean annual raptor use ranged from 0.06 raptors/20-min survey to 2.34 raptor s/20-min survey. Based on the results from these facilities, a ranking of mean annual raptor use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 – 1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (over 3.0; Strickland et al. 2011). Using this ranking, mean raptor use in the Project Area is considered to be low to moderate with the most abundant raptors at the project being northern harrier, Swainson's hawk, and red-tailed hawk.

Waterbirds and Waterfowl

Water birds primarily use the Project Area during migration between their southern wintering grounds and northern summer habitat, and are not resident year-round. Nine waterbird and waterfowl species were observed during surveys in the spring and summer of 2013: sandhill crane, blue-winged teal, Canada goose, gadwall, mallard, northern pintail, northern shoveler, redhead, and tundra swan. Of these species, sandhill crane and Canada goose had observed flights of individuals initially observed at the rotor swept height. However, empirical evidence suggests that waterfowl and waterbird mortality is not proportional to pre-construction mean use by these species (Erickson et al 2004, Anderson et al. 2005, Jain et al. 2007). Based on the available evidence, waterfowl and waterbirds do not seem vulnerable to direct impacts.

Passerines

Passerines (songbirds) were the most abundant bird type observed during surveys. Migrant passerines are found more often in post-construction mortality monitoring compared to other groups of birds (Arnett et al. 2007, Strickland and Morrison 2008, Strickland et al. 2011). Although nocturnal migrants comprise the majority of songbird fatalities, the proportion of migrating songbirds killed at any given wind project during migration is reported to be low (Strickland et al. 2011). Locally breeding songbirds may experience lower mortality rates than migrants because many of these species tend not to fly at turbine heights during the breeding season, except some species with aerial flight displays in the rotor swept area (Pickwell 1931, Johnson and Erickson 2011).

During the avian surveys, 4,875 small birds were observed. The Lapland longspur was observed 1,530 times, and the horned lark and red-winged blackbird were both observed over 600 times. Lapland longspur is found in large flocks, hence the large numbers seen during surveys. Although fatalities of horned lark and red-winged blackbird have been documented at other wind energy facilities (Tetra Tech 2012), if fatalities occur at the Project, they are unlikely to have population-level impacts.

Grouse

During spring and summer avian point county surveys, 39 sharp-tailed grouse observations were recorded. During spring lek surveys, 13 confirmed and possible leks were observed in or near the Project Area, with as many as 30 birds at a single lek. Particular concern over the effects of development on grouse has been raised by agencies and non-governmental groups with respect to grouse species (USFWS 2012). Studies of grouse and development have suggested that some species of grouse respond to transmission lines, improved roads, buildings, oil and gas wells, and communication towers by avoiding these facilities (Pitman et al. 2005, Pruett et al. 2009, Johnson et al. 2012). However, other studies have found no evidence of an avoidance response to transmission lines or wind facilities (Johnson et al. 2012, Sandercock et al. 2013). Although some studies have concluded that avoidance of development is a response to the height of the structure or that the structure might provide a perch for hunting raptors, Walters et al. (2014) found that, in most published studies, the effect of the height of a structure could not be conclusively isolated from the other effects of energy development. Further, Walters et al. (2014) found no evidence to support or reject the hypothesis that grouse avoid tall structures due to increased predation risk. Thus, while some evidence exists that grouse avoid development, the mechanism responsible for the observed patterns remains unclear (Walters et al. 2014). Based on surveys, grouse are present in the Project Area. Sunflower will negotiate an appropriate buffer distance from grouse leks with agencies with jurisdiction, and will restrict construction activities during grouse breeding season to the extent practicable.

Bats

Overall, there is a low likelihood of occurrence for bat species for the entire Project Area. Should bats occur in the Project Area, the potential for direct impacts (e.g., mortality resulting from turbine collisions or barotraumas) will be minimized by turbine siting away from areas of potential bat activity such as wetlands. Based on the available data, it is expected that bat fatalities at the Project, while likely low overall, will be highest during late summer and early fall at potential turbine locations.

Birds of Conservation Concern

Nine Birds of Conservation Concern were observed during surveys. Impacts to Birds of Conservation Concern would be avoided or minimized through the implementation of measures identified in the Draft UGP Wind Energy PEIS as listed below.

Species of Conservation Priority

Sixteen North Dakota Species of Conservation Priority were observed during wildlife surveys, and an additional seven are known to occur in Stark and Morton counties. None of the five Species of Conservation Priority that are also ESA-listed have been documented to occur in the

Project Area. Impacts to Species of Conservation Priority would be avoided or minimized through the implementation of measures identified in the Draft UGP Wind Energy PEIS as listed below.

Other Wildlife

Mobile species such as deer, antelope or other mammals would be expected to avoid the Project construction areas. Direct impacts to non-avian wildlife species would generally be limited to direct mortality to small mammals, amphibians and non-mobile species resulting from construction of the Project access roads, turbine pads, and the substation and interconnection switchyard. Such impacts would not be significant given that the habitats to be disturbed and their resident species are not rare or unique.

Indirect Impacts

The presence of wind turbines may alter the landscape so that wildlife use patterns are affected, displacing wildlife away from the Project facilities and suitable habitat. In addition to direct effects through collision mortality, wind energy development results in indirect effects such as direct loss of habitat where infrastructure is placed and indirect loss of habitat through behavioral avoidance and perhaps habitat fragmentation.

Indirect permanent effects including displacement may occur as a result of alterations to the landscape or food availability. Construction also reduces habitat effectiveness because of the presence of access roads and gravel pads surrounding turbines (WEST 2010b, 2011). The greatest concern with displacement effects for wind energy facilities in the United States has been where these facilities have been constructed in grassland or other native habitats (Leddy et al. 1999; Mabey and Paul 2007). Three studies on grassland bird species have shown reduced use of habitat near wind turbines (WEST 2010b). A study of a wind energy facility in Minnesota showed the area of reduced use extended about 100 meters from the turbines, while studies of wind energy facilities in Oregon and Washington showed the area of reduced-use extended approximately 50 meters from the turbines. Based on these studies, there could be a reduction in habitat use by grassland species at the Project site, and this area could extend from approximately 50 to 100 meters from the turbines. Effects to feeding, resting, migrating birds, and breeding birds have been documented at wind energy facilities around the United States (WEST 2010b, 2011; Erickson et al. 2004). It is not known whether birds habituate to wind energy facilities over time, but research on this topic is ongoing.

Indirect impacts to non-avian wildlife would include displacement and loss of habitat for mobile species such as deer or antelope. These effects would not be significant given that displacement in response to construction would be short-term, and the habitat to be lost is common throughout the area.

Avoidance, Minimization and Best Management Practices

Sunflower will implement measures during construction, operations and decommissioning to avoid or minimize impacts to wildlife as identified in the Draft UGP Wind Energy PEIS Section 5.6.2, as follows:

Measures applicable to Project planning and design:

- Follow the recommendations provided in the U.S. Fish and Wildlife Service Land-Based Wind Energy Guideline (USFWS 2012b) and, as appropriate, the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2 (USFWS 2013e). In addition, follow guidelines or recommendations developed by individual States (e.g., IDNR 2011; Kempema 2009; Nebraska Wind and Wildlife Working Group 2011) to address potential effects of wind energy development on ecological resources.
- Prepare a Bird and Bat Conservation Strategy. The overall goal of such a plan is to reduce or eliminate avian and bat mortality. The wind energy facility developer should work closely with the Service and the appropriate State wildlife agencies to identify protective measures to include in the plan. These would include project design measures, construction phase measures, operational phase measures, and decommissioning phase measures. Post-construction monitoring may be needed to validate the preconstruction risk assessment and allow the facility operators to implement adjustments based on identified problems. Results of monitoring activities shall be reported to the appropriate State or Federal agency in a timely manner. If bat monitoring is appropriate for the site, installation of bat acoustic monitors should be considered at the time meteorological towers are installed to reduce costs and minimize delays by collecting data early in the site review process.
- Review existing information on species and habitats in the project area. Identify important, sensitive, or unique habitat (including large contiguous tracts of grassland cover/habitat) and biota in the project vicinity and site, and design the project to avoid, minimize, or mitigate potential impacts on these resources. Avoidance is the preferred choice for minimizing impacts. The design and siting of the facility should follow appropriate guidance and requirements from the Service, State permitting agencies, and other resource agencies, as available and applicable. In addition, attention should be paid to project placement that may be within or near Important Bird Areas or Important Migratory Shorebird Stopover Sites, or where bird species of conservation concern are known to occur.
- Contact appropriate Federal and State agencies (including State entities responsible for permitting energy development projects) early in the planning process to identify potentially sensitive ecological resources known to be present or likely to be present in the vicinity of the wind energy development.
- If appropriate, conduct surveys for presence of Federal- and State-protected species and other species of concern and the habitats for such species that have a reasonable potential to occur within the project area based on habitat characteristics. Consult with the Service and/or appropriate State agency to identify species likely to be present and appropriate survey techniques, determine permit needs, and identify/apply species-specific avoidance and minimization measures.
- Evaluate potential avian and bat use (including the locations of active nest sites, colonies, roosts, and migration corridors) of the project and use data to plan turbine (and other structure/infrastructure) locations to minimize impacts.

- The transmission lines should be designed and constructed with regard to the recommendations in Avian Protection Plan Guidelines (APLIC and Service 2005), in conjunction with Suggested Practices for Avian Protection on Power Lines (APLIC 2006) and Reducing Avian Collisions with Power Lines (APLIC 2012), to reduce the operational and avian risks that result from avian interactions with electric utility facilities. For example, transmission line support structures and other facility structures should be designed to reduce the likelihood of electrocution with proper spacing of components and by the use of line marking devices, where warranted and appropriate, to reduce the likelihood of collision.
- Evaluate the potential for the wind energy project to adversely affect bald and golden eagles in a manner consistent with the draft Eagle Conservation Plan Guidance (Service 2011a). Early in the planning of transmission interconnection and wind farm location, coordination with Service Field Offices with respect to the guidance is highly recommended. Documented occurrence of eagles can be acquired from the local U.S. Fish and Wildlife Ecological Services office, State wildlife agencies, or State natural heritage databases. In accordance with the Service's Land-Based Wind Energy Guidelines (Service 2012b), surveys during early project development should identify all important eagle use areas (nesting, foraging, and winter roost areas) within the project's footprint. If eagle use areas occur within a 10-mi (16-km) radius of a project footprint, the project developer should develop an Eagle Conservation Plan (ECP).
- Use existing roads to the maximum extent feasible to access a proposed project area. Install meteorological towers and conduct other characterization activities (e.g., geotechnical testing) as close as practicable to existing access roads.
- Minimize the area disturbed during the installation of meteorological towers (i.e., the footprint needed for meteorological towers and associated laydown areas).
- Do not locate individual meteorological towers in or adjacent to sensitive habitats or in areas where ecological resources known to be sensitive to human activities are present.
- Schedule the installation of meteorological towers and other characterization activities to avoid disruption of wildlife reproductive activities or other important behaviors (e.g., do not install towers during periods of sage-grouse nesting).
- Avoid or minimize the use of guy wires on meteorological towers. Equip any needed guy wires with line marking devices.

Measures applicable during construction:

- Consult with the appropriate natural resource agencies to avoid scheduling construction activities during important periods for wildlife courtship, breeding, nesting, lambing, or calving that are applicable to sensitive species within the project area.
- Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. Pets should not be allowed on the project area.
- Establish buffer zones around known raptor nests, bat roosts, and biota and habitats of concern if site evaluations show that proposed construction activities would pose a significant risk to avian or bat species of concern.

- If needed during construction, only use explosives within specified times and at specified distances from sensitive wildlife or surface waters as established by the appropriate Federal and State agencies.
- Minimize the use of guy wires on permanent meteorological towers. If guy wires are necessary, they should be equipped with line marking devices.
- Place marking devices on any newly constructed or upgraded transmission lines, where appropriate, within suitable habitats for sensitive bird species.

Measures applicable during operations phase:

- Turn off unnecessary lighting at night to limit attraction of migratory birds. Follow lighting guidelines, where applicable, from the Wind Energy Guidelines Handbook (page 50, items 10 and 11, in Service 2012b). This includes using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination, and avoidance of steady-burning, high-intensity lights.
- Increasing turbine cut-in speeds (i.e., prevent turbine rotation at lower wind velocity) in areas of bat conservation concern during times when active bats may be at particular risk from turbines (Arnett et al. 2011).[4]
- Instruct employees, contractors, and site visitors to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. Pets should not be allowed on the project area.
- In the absence of long-term mortality studies, monitor regularly for potential wildlife problems including wildlife mortality. Report observations of potential wildlife problems, including wildlife mortality, to the appropriate State or Federal agency in a timely manner, and work with the agencies to utilize this information to avoid/minimize/offset impacts. The Ecological Services Division of the Service shall be contacted. Development of additional mitigation measures may be necessary.

Measures applicable during decommissioning:

- All turbines and ancillary structures should be removed from the site.

Additional site-specific measures to further reduce impacts to wildlife may be identified and implemented as appropriate; however, impacts to wildlife are not expected to be significant.

4.10 Threatened, Endangered, Proposed, and Candidate Species

The ESA, as administered by the USFWS, mandates protection of species federally listed as threatened or endangered and their associated habitats. The ESA makes it unlawful to "take" a listed species without special exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct." Significant modification or degradation of listed species' habitats is considered "harm" under ESA

[4] The bat survey report from WEST (see Appendix C) notes that, "Bat activity recorded at the SWP by ground detectors at met towers during the [fall migration period] was the lowest activity when compared to all publicly-available reports from facilities in Midwest and the third lowest when compared to all facilities in North America with similarly-collected activity data (Appendix A), potentially indicating low direct impacts to bats." Based on the WEST analysis, it is not expected that turbine cut-in speeds would be warranted for Sunflower.

regulations and projects that have such potential will require consultation with USFWS. Candidate species receive no statutory protection from the USFWS; however, they do receive full protection once listed. In addition, federal action agencies may elect to treat candidate and proposed species as listed.

Protected species (a collective term for ESA-listed threatened, endangered, proposed and candidate species) are discussed in the Draft UGP Wind Energy PEIS and the associated Programmatic Biological Assessment. However, because these documents had not been finalized at the time of this EA, consultation pursuant to Section 7 of the ESA is required. Western has consulted with the USFWS service as required by the ESA, and a Biological Assessment will be provided as Appendix E in the Final EA. Western has requested an informal conference for two proposed species and one candidate species (Appendix F). These species are the northern long-eared bat (*Myotis septentrionalis*), rufa red knot (*Calidris canutus rufa*), and Sprague's pipit (*Anthus spragueii*), which are discussed in the following section.

4.10.1 Existing Conditions

The USFWS provides federally threatened, endangered, and candidate species data at the county level for public use. According to the USFWS, Stark County has three endangered species, two proposed species and one candidate species, and Morton County has five endangered species, one threatened species, two proposed species and one candidate species (see Table 11; USFWS 2010). There are no protected plant species known to occur in the Stark or Morton counties.

Table 11. Federally Listed and Candidate Species in Stark and Morton Counties

Common Name	Latin Name	County	Habitat	Status
Black-footed Ferret	*Mustela nigripes*	Morton, Stark	Prairie dog complexes	Endangered
Gray Wolf	*Canis lupus*	Morton, Stark	Frequently observed in Turtle Mountains	Endangered
Interior Least Tern	*Sternula antillarum*	Morton	Missouri River and Yellowstone sandbars; beaches;	Endangered
Piping Plover**	*Charadrius melodus*	Morton	Missouri River sandbars, alkali beaches	Threatened
Pallid Sturgeon	*Scaphirhynchus albus*	Morton	Bottom dwelling, Missouri and Yellowstone Rivers	Endangered
Whooping Crane	*Grus Americana*	Morton, Stark	Palustrine wetlands and cropland ponds	Endangered
Sprague's pipit	*Anthus spragueii*	Morton, Stark	Native prairie	Candidate
Northern Long-eared Bat	Myotis septentrionalis	Unknown***	Caves, mines and deciduous forests	Proposed
Rufa red knot	*Calidris canutus rufa*	Unknown***	Coastal areas and wetlands	Proposed

Source: USFWS 2010

** Designated Critical Habitat for piping plover is located on the following water bodies: Lake Audubon, Lake Sakakawea, and the Missouri River. All of these water bodies are located north and east of the Project Area.

*** Species has not been defined at a county level in North Dakota.

Black-footed ferret

Historically, black-footed ferrets occupied much of the Great Plains region of North America, collocating with prairie dog (*Cynomys* sp.) colonies and complexes. Black-footed ferrets depend on prairie dog complexes for food and habitat. Prairie dogs and black footed ferrets prefer level topography in grasslands, steppe, and shrub steppe. Plowed lands, forests, wetlands, and water are avoided (USFWS 1988). There are no records of recent black-footed ferret occurrences in North Dakota but there is potential for reintroduction (USFWS 2008b, cited in HDR 2011, included in Appendix D).

No black-footed ferrets were observed during WEST's wildlife surveys of the Project Area (see Appendix C). In addition WEST did not report prairie dog colonies in the Project Area; therefore, no suitable habitat is available for black-footed ferrets due to no prairie dog colonies in the area.

Whooping Crane

The whooping crane is protected by both state and federal laws in the United States. It was listed as endangered in the United States in 1970 under the Endangered Species Preservation Act of 1966 (16 USC Section 668aa(c)) and then under the ESA in 1973. Critical habitat was designated in 1978. Under the North Dakota Comprehensive Wildlife Conservation Strategy Guide (NDGFD, 2005), the whooping crane is a Level III Species of Conservation Priority, defined as "North Dakota's species having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota" (NDGFD, 2005)

One self-sustaining wild population of whooping cranes currently exists in the world. Members of this population breed primarily within the boundaries of Wood Buffalo National Park in Canada and migrate through the central United States en route to the wintering grounds at Aransas National Wildlife Refuge along the Gulf Coast of Texas. This flock is referred to as the Aransas-Wood Buffalo National Park Population. Due to intensive management, this population has increased from 15 birds in 1941 to 263 as of the start of spring migration in 2010 (WCCA 2010). The migration route is well defined and 95 percent of all observations occur within a 200-mile wide corridor during spring and fall migration (CWS and USFWS 2007). The USFWS subdivides this corridor into 5 percent increments starting at 75 percent. The Project Area is within the area encompassing 85 to 90 percent of confirmed whooping crane sightings, and is approximately 71 mi (114.2 km) west of the migration corridor centerline.

Sunflower contracted WEST to complete an analysis of potential whooping crane habitat in the Project Area (see Whooping Crane Habitat Review report in Appendix C). The habitat review and analysis evaluated whether the proposed Project Area represented high, average or low potential whooping crane habitat as compared to nearby alternate locations of the same dimensions located a few miles to the north, south, east and west. The potential whooping crane habitat analysis included a comparison of land cover from the National Land Cover Database, National Wetland Inventory, and 2012 NAIP aerial imagery within the proposed Project Area and the four alternate areas.

WEST also used the methodology of a study developed by The Watershed Institute (Watershed Institute 2012) where habitat in Kansas was assessed based on its potential suitability to quantify and compare whooping crane habitat within the study areas. This assessment first screens all wetlands within the study areas for minimum size, visual obstructions, and disturbances. Those wetlands left are then quantified by their size, density of wetlands around them, distance to food, whether they are natural or manmade, and their water regime as a means to quantify suitability. The Watershed Institute determined that a score of 12 or higher represented suitable whooping crane habitat.

Wetlands in the Project Area were rated with scores from four to 13 with a mean suitability score of 8.5; mean suitability scores and ranges for the other four reference areas were similar. The mean score and most of the individual wetland scores are much lower than the reference score determined to be suitable potential habitat in Kansas (a score of 12 or more).

No whooping cranes were observed during spring and summer avian use surveys (see Appendix C). Nevertheless, whooping cranes may migrate over the Project Area and there is potential for roosting or foraging use, however based on the findings of the WEST assessment, the Project Area does not provide significant potential habitat nor does it provide unique habitat compared to adjacent areas. Although the Project Area is within the defined migration corridor, no whooping cranes have been documented within the Project Area. The closest confirmed sighting in 2010 is approximately 15 miles northwest of the Project Area.

In addition, a study was presented at the 2012 National Wind Coordinating Collaborative meeting describing avoidance behavior of whooping and sandhill cranes at a wind farm in South Dakota (Nagy et al. 2012). Sandhill cranes altered flight trajectory away from turbines when flying within the height of the rotor-swept area more often than when flying above the rotor-swept area. It is likely that whooping cranes will respond similarly and move around wind turbines.

In 2007 the USFWS and the Canadian Wildlife Service released the International Recovery Plan (Third Revision; CWS and USFWS 2007) for the whooping crane. That plan includes recovery strategies and actions to be implemented to improve the likelihood of whooping crane population recovery. The strategies and actions described in the International Recovery Plan are echoed in the avoidance and minimization measures and BMPs identified in the Draft UGP Wind Energy PEIS, as listed below.

In a letter dated September 19, 2013, the NDGFD provided comments to Sunflower regarding the Project (see Appendix B); whooping cranes were not specifically addressed in that letter. The primary concerns expressed included limiting impacts within native prairie to the extent possible; avoiding wetlands and alternations to surface drainage patterns; and placing electrical collection lines underground where possible, and applying appropriate APLIC design standards for any necessary above-ground segments.

The USFWS provided comments on the Project in a letter dated December 20, 2013, in response to scoping (see Appendix B). The letter notes the presence of potentially suitable roosting and feeding habitat for whooping cranes in the Project Area, and recommends mapping wetlands within one mile of all turbines, and analyzing the potential effects to migrating whooping cranes from loss of use of habitat in the Project Area for migration stopovers. The

USFWS recommended that “if a whooping crane is sighted within one mile of the project while it is under construction, that all work cease within one mile of that part of the project and the [USFWS] be contacted immediately. In coordination with the [USFWS], work may resume after the bird(s) leave the area,” The USFWS further recommended the installation of visual marking devices on existing transmission lines within one mile of potentially suitable whooping crane habitat. The USFWS letter includes general recommendation to avoid or minimize impacts to existing high value habitat types, including native prairie, woodlands, wooded draws and riparian forests be avoided whenever possible. It also recommends minimizing impacts to wildlife and habitat by reseeding disturbed native prairie; minimizing grassland disturbance by using fewer, larger turbines and fewer access roads; using self-standing towers (no guy wires); avoiding wetland fill; replacing unavoidable wetland impacts with functionally equivalent wetlands; and utilizing appropriate erosion control measures to prevent water quality degradation. Sunflower is developing a bird and bat conservation plan for the Sunflower Wind Project that will utilize recommendations from the USFWS and other agencies to minimize impacts to the degree possible based on the best available science for the species of concern that may occur in the vicinity of the Project.

Pallid Sturgeon

The pallid sturgeon historically occupied the Mississippi and Missouri rivers and their major tributaries (USFWS 1990a). The reason for decline of the sturgeon has been water control and development projects on the Mississippi and Missouri rivers. The sturgeon still occupies portions of the main stem of the Missouri River. There is no pallid sturgeon habitat in the Project Area.

Interior Least Tern

The interior population of the least tern was listed as an endangered species in 1985 (USFWS 1985a). In North Dakota, the interior least tern is primarily found on sandbars on the Missouri River between the Garrison Dam and Lake Oahe, in the reservoirs, and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea (USFWS North Dakota Ecological Field Services Office 2008). This tern nests on barren sandbars on the Missouri River and feeds on small fish in the river (USFWS 1990b). As of 2008, approximately 100 pairs were known to breed in North Dakota (USFWS 2008b). Critical habitat for the interior least tern has not been designated.

No interior least terns were observed during spring and summer avian use surveys (see WEST report in Appendix C). There is no suitable breeding or stopover habitat within or near the Project Area.

Piping Plover

The Great Plains population of the piping plover was listed as a threatened species in 1985 (USFWS 1985b). The piping plover breeding range stretches from south central Canada into the Midwest United States. The majority of piping plover breeding pairs found in the United States are concentrated in Montana, the Dakotas, and Nebraska. This population of piping plover winters in the Gulf of Mexico. The plover nests in 23 counties in North Dakota, primarily in alkali wetlands in the Missouri Coteau and on barren sandbars in the Missouri River and system reservoirs. Reasons for decline of the piping plover include habitat loss and nest depredation in the wetlands. The main reason for decline of the species along the Missouri River is habitat loss due to water development projects (e.g. Fort Peck Dam, Garrison Dam, and Oahe Dam) and loss of wetlands due to agriculture and other developments.

Critical habitat for the piping plover was designated on September 11, 2002 (USFWS 2002). There is no USFWS-designated critical habitat for the piping plover in the Project Area (50 CFR Part 17). The closest critical habitat is located along Lake Sakakawea approximately 45 miles north of the Project Area.

No piping plovers were observed during spring and summer avian use surveys (see WEST report in Appendix C). There is no suitable breeding or stopover habitat within or near the Project Area.

Gray Wolf

The gray wolf was listed as an endangered species in 1978 (USFWS 1978). In 2003, the USFWS downlisted the two northern subpopulations (western and eastern distinct population segments) to threatened (USFWS 2003). While additional decisions regarding the western populations of gray wolf have been made more recently, the eastern population remains listed as threatened. Once common throughout North Dakota, the last confirmed sighting in the state was 1991, although there have been more recent but unconfirmed reports of sightings in the Turtle Mountains in the north-central portion of the state. The presence of wolves in most of North Dakota would likely remain sporadic and consist of occasional dispersing animals from Minnesota and Manitoba (USFWS 2008a).

There were no incidental observations of gray wolves during spring and summer avian use surveys (see WEST report in Appendix C).

Sprague's Pipit

The Sprague's pipit is closely tied with native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota and South Dakota as well as south-central Canada (Jones 2010). The USFWS reviewed the conservation status of Sprague's pipit to determine whether the species warrants protection under the ESA. The status review found that listing Sprague's pipit as threatened or endangered is warranted, but that listing the species at this time is precluded by the need to complete other listing actions of a higher priority (Jones 2010). Currently the Sprague's pipit remains a candidate species for listing under the ESA and is also protected under the MBTA. Conversion of native prairie to agriculture and overgrazing in much of this species' range continue to cause declines on breeding and wintering grounds (Jones 2010).

No Sprague's pipits were observed during spring and summer avian use surveys (See Appendix C).

Northern Long-eared Bat

On October 2, 2013, the northern long-eared bat was proposed for federal listing as endangered under the ESA throughout its range (USFWS 2013a). The range of this species includes eastern and north central United States, including North Dakota. Habitat includes caves and mines for hibernating during the winter, called hibernacula, as well as underneath bark, in cavities or crevices of live and dead trees in the summer for roosting. This medium sized bat (approximately 3.0 – 3.7 inches) with a wing span of 9 -10 inches is distinguishable from other bats by it its long ears (USFWS 2013b).

Threats to the northern long-eared bat include white nose syndrome, impacts to hibernacula and impacts to summer habitat. No hibernacula are known from North Dakota and no known mines, caves or other cave-like structures occur in the Project Area. In addition, there is very little potential summer habitat in the Project Area, therefore, habitat is limited for northern long-eared bats.

Rufa Red Knot

On September 27, 2013 the rufa red knot was proposed for federal listing as threatened under ESA (USFWS 2013c). Rufa red knot fly very long distances during migration (over 9,000 miles) in the spring and autumn. Their range predominately encompasses coastal areas from south of Tierra del Fuego to as far north as the central Canadian Arctic. Rufa red knot have been documented in most states during migration, including North Dakota. This species depends on suitable habitat, food and weather conditions along its migration route. Rufa red knot feed predominately on clams, mussels, snails and other invertebrates, consuming even their shells. However, stop over habitats, including wetlands, require the presence of easily-digestible food such as juvenile clams and mussels and horseshoe crab eggs (UFWS 2013d).

4.10.2 Potential Impacts

A significant impact to endangered, threatened, proposed, and candidate species would occur if: 1) the Project resulted in the loss of individuals of a population leading to a jeopardy opinion from the USFWS; or 2) the Project resulted in the loss of individuals leading to the upgrade (e.g., change in listing from threatened to endangered) of the federal listing of the species.

Impacts to wildlife can be short-term (one or two reproductive seasons, generally during the construction period), or long-term (affecting several generations during the life of the Project). Impacts can also be direct (an immediate effect to an individual, population, or its habitat), or indirect (an effect that may occur over time or result from other actions).

The Project would have no impact on pallid sturgeon, as there is no habitat for this fish within the Project Area, and the Project would not impact water quality in the Missouri River or its major tributaries where the pallid sturgeon is known to occur. The Project is highly unlikely to have an impact on the gray wolf or black-footed ferret, due to their scarcity in the region and no recent records of occurrence near the Project Area. Similarly, the Project is unlikely to impact piping plover or interior least tern, as there have been no documented occurrences of either species in or near the Project Area. The Project is also unlikely to impact whooping cranes, as there have been no documented occurrences in or near the Project Area. Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines is also unlikely to impact listed species, largely because the transmission lines are already present and reconductoring would not significantly alter their design.

Sunflower will implement the avoidance and minimization measures and BMPs listed in the Draft UGP Wind Energy PEIS (see PEIS section 5.6.2, and Table 2.3-2, as follows:

Measures applicable to protection of Black-Footed Ferret

- Report observations of ferrets, their sign, or carcasses on the project area to the Service within 24 hours and work with the black-footed ferret coordinator or local Ecological Services Office to determine if additional measures need to be undertaken.

Measures applicable to protection of Whooping Crane

Survey Requirements and Avoidance Measures:

For projects that occur within the portion of the whooping crane migration corridor that encompasses 95% of historic sightings:

- Conduct preconstruction evaluations and/or surveys to identify wetlands that provide potentially suitable stopover habitat.
- Do not site turbines, transmission lines, access roads, or other project facilities within or adjacent to wetlands that provide suitable stopover habitat or within 5 mi (8 km) of the Platte or Niobrara Rivers.
- Do not site turbines, transmission lines, access roads, or other project facilities within 5 mi (8 km) of designated critical habitat.

Conservation Measures:

For projects that that occur within the portion of the whooping crane migration corridor that encompasses 95 percent of historic sightings:

- Place state-of-the-art bird flight diverters on any new or upgraded overhead collector, distribution, and transmission lines located within 1 mi (1.6 km) of suitable stopover habitat.
- Establish a procedure for preventing whooping crane collisions with turbines during operations by establishing and implementing formal plans for monitoring the project site and surrounding area for whooping cranes during spring and fall migration periods throughout the operational life of the project and shutting down turbines and/or construction activities within 2 mi (3.2 km) of whooping crane sightings. Specific requirements of the monitoring and shutdown plan will be determined during site-specific ESA consultations, but will include adequate coverage (appropriate dates, times, numbers, and qualifications of observers) based on size of the wind farm.
- Instruct workers to avoid disturbance of cranes present near project areas.

Measures applicable to protection of Pallid Sturgeon

Survey Requirements and Avoidance Measures:

- Conduct preconstruction evaluations and/or surveys in areas of potential occurrence to identify suitable habitat and areas of occurrence within project boundaries.
- Do not site turbines, access roads, transmission line towers, or other project facilities in or adjacent to aquatic habitat where pallid sturgeon occurs.

Conservation Measures:

For projects that encompass areas within drainages occupied by pallid sturgeon:

- Employ BMPs during and after construction to control erosion and runoff to aquatic habitats.
- Avoid using herbicides or pesticides in the vicinity of aquatic habitats.
- Employ measures to minimize the amount of stream habitat disturbance when transmission lines and access roads must be constructed across streams.
- Ensure that upstream and downstream fish passage is maintained in any areas where stream habitat disturbance occurs.
- Avoid actions that would alter surface water flow in occupied habitat.

Measures applicable to protection of Interior Least Tern

Survey Requirements and Avoidance Measures:

- Do not site turbines, access roads, transmission lines, or other project facilities within 1.50 mi (2.3 km) of suitable sandbar habitat, reservoir shorelines, or other known shoreline nesting, resting, and foraging areas.

Conservation Measures:

- Conduct construction activities during the non-breeding season in areas near known occupied habitat.
- Mark new overhead power lines within 1 mi (1.6 km) of known least tern habitat with bird flight diverters.
- If least terns nest in the project area during construction, avoid construction activities within 1.5 mi (2.3 km) of nesting areas during late April to August.

Measures applicable to protection of Piping Plover

Survey Requirements and Avoidance Measures:

- Do not site turbines, access roads, transmission lines, or other project facilities within 2 mi (3.2 km) of suitable sandbar habitat, reservoir shorelines, alkali wetlands, or other known shoreline nesting, resting, and foraging areas.
- Do not site turbines, transmission lines, access roads, or other project facilities in or within 2 mi (3.2 km) of designated critical habitat.

Conservation Measures:

- Mark new overhead power lines or upgraded transmission lines within 1 mi (1.6 km) of known piping plover habitat with bird flight diverters.
- If piping plovers nest in the project area during construction, avoid construction activities within 0.5 mi (0.8 km) of nesting areas during late April to August.

Measures applicable to protection of Sprague's Pipit

Survey Requirements and Avoidance Measures:

- Avoid placement of turbines, access roads, and transmission lines on or within 1,000 ft (304.8 m) of suitable native prairie tracts larger than 160 ac (64.7 hectares).

Conservation Measures:

- Design layouts to minimize further fragmentation of native prairie habitats that are suitable for Sprague's pipit.
- Conserve or restore native prairie habitats to offset impacts on native prairie caused by fragmentation, as determined in tiered site specific consultation.

Measures applicable to protection of Gray Wolf

Survey Requirements and Avoidance Measures:

- Conduct preconstruction evaluations and/or surveys in areas of potential occurrence to identify suitable habitat and areas of occurrence within project boundaries.
- Do not site turbines, transmission lines, access roads, or other project facilities in habitats occupied by gray wolf.

Additional site-specific measures to further reduce impacts to protected species may be identified and implemented as appropriate; however, impacts to protected species are not expected to be significant.

4.11 Socioeconomics

Because of the way that socioeconomic data is collected and aggregated, the analysis area for socioeconomics is Morton and Stark counties.

4.11.1 Existing Conditions

The Project is located in Stark and Morton counties, North Dakota, a primarily rural agricultural area located south of U.S. Highway 94 and approximately 55 miles west of Bismarck, ND and 30 miles east of Dickinson, ND.

There are several small cities near the Project Area. The city of Hebron (2010 population 747) is located a few miles north of the Project Area; Richardton (2010 population 529) is located approximately 10 miles to the northwest of the Project; and Taylor (population 148, is located approximately 15 miles to the northwest. The city of Glen Ullin (2010 population 807) is located approximately 9 miles to the southeast. The largest city in the area is Dickinson (2010 population 17,787), located approximately 30 miles to the west of the Project. There is no indication of any new residential construction within the Project Area.

Stark County

In the 2010 US Census the population of Stark County was reported at 24,199, an increase of 6.90 percent from the 2000 Census count of 22,636. In the 2010 US Census the population of Morton County was reported at 27,471, an increase of 8.57 percent from the 2000 Census count of 25,303. The population of North Dakota according to the 2000 Census was 642,200, and grew by 4.73 percent to 672,591 in 2010 (U.S. Census Bureau 2010).

Stark County contains 1,338 square miles of land, with a density of just over 18 persons per square mile; the population density of the census block group in which the Project Area is located (Stark County Tract 9633, Block Group 2) is approximately 1.6 persons per square mile. Approximately 94 percent of the county population is composed of white persons who are not of Hispanic or Latino origin. The median age of Stark County residents is 38.3 years. Approximately 16 percent of the county population is 65 years or older while only 6 percent of the population is under five years of age (US Census Bureau 2010). There are a total of 10,638 housing units in Stark County, of which approximately 7.9 percent are vacant.

According to the 2010 Census, almost a quarter (22.1%) of the workforce in Stark County worked in education, health, and social services. Retail trade accounts for over 13 percent of the jobs in the county. Per capita income in 1999 was $27,347; median household income was $55,196. Approximately 7.4 percent of the population lived below the poverty level, compared to 14.3 percent nationwide.

Agriculture plays a significant role in the County's land use and economy. In 2007, there were 865 farms in Stark County, comprising approximately 98 percent (837,143 acres) of the land area. In 2007, there were 865 farms in Stark County, comprising approximately 98 percent (837,143 acres) of the land area. According to the 2007 Census of Agriculture (USDA 2007), total market value of agricultural products produced in Stark County was $96,812,000, 65 percent of which was from crops and 34 percent from livestock sales. The primary livestock is cattle and the principal crops include wheat and forage. Sunflowers, corn, and barley are also grown.

Tax revenues in Stark County fund a number of vital community services, including fire protection and law enforcement, emergency management, health and welfare services, and public schools. Tax revenues also fund agricultural extension services, weed management programs, and a roads maintenance department, along with other typical county government services.

Morton County

Morton County contains 1,936 square miles of land, with a density of just over 14 persons per square mile; the population density of the census block group in which the Project Area is located (Morton County Tract 205, Block Group 2) is approximately 2.6 persons per square mile. Approximately 95 percent of the county population is composed of white persons who are not of Hispanic or Latino origin. The median age of Stark County residents is 39.3 years. Approximately 15 percent of the county population is 65 years or older while only 7 percent of the population is under five years of age (US Census Bureau 2008). There are a total of 11,972 housing units in Morton County, of which approximately 8.8 percent are vacant.

According to the 2010 Census, a fifth (20.6%) of the workforce in Morton County worked in education, health, and social services, and another 12.7 percent in agriculture, forestry, fishing and hunting, and mining. Retail trade accounts for 10.2 percent of the jobs in the county. Per capita income in 1999 was $26,678; median household income was $54,269. Approximately 9.3 percent of the population lived below the poverty level, compared to 14.3 percent nationwide.

Agriculture plays a significant role in the County's land use and economy. In 2007, there were 836 farms in Morton County, comprising approximately 94 percent (1,165,098 acres) of the land area. According to the 2007 Census of Agriculture (USDA 2007), total market value of agricultural products produced in Morton County was $117,251,000, 52 percent of which was from crops and 48 percent from livestock sales.

Tax revenues in Morton County fund a number of vital community services, including fire protection and law enforcement, emergency management, health and welfare services, and public schools. Tax revenues also fund agricultural extension services, weed management programs, and a roads maintenance department, along with other typical county government services.

4.11.2 Potential Impacts

Significant direct socioeconomic impacts would occur if the Project resulted in the degradation or commitment of existing goods and services to an extent that would limit the sustainability of existing communities. Potential indirect socioeconomic impacts could result from changes to the appearance of the local landscape, the presence of the Project as a new land use, changes to the work force and tax base, or removal of land from active agricultural use.

Economic Impacts

The Project would have positive economic impacts for the local population, including lease and royalty payments for participating landowners, employment, and property and sales tax revenue. Landowner compensation will be established by individual lease agreements, but are anticipated to total over $800,000 annually. Annual property tax payments to local county governments for the Proposed Action are estimated at $500,000. This would ultimately have a positive effect on area schools, law enforcement and fire services, health services, and other civic services that rely on tax revenue. In general, agricultural areas surrounding each turbine can still be farmed. In addition, in an environment of uncertain and often declining agricultural prices and yields, the supplemental income provided to farmers from wind energy leases will provide stability to farm incomes and thus will help assure the continued viability of farming in the Project Area.

The Proposed Action would create 8 to 12 full-time permanent jobs and up to 300 peak construction jobs. To the extent that local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Morton and Stark counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county as well as the state by circulation and recirculation of dollars paid out by Sunflower Wind as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies and other products and services will benefit businesses in the county.

These anticipated impacts are consistent with the limited amount of published information on other projects. A 2009 case study evaluated the socioeconomic impacts of a wind energy facility constructed in 2007 and 2008 in Cavalier County, northeastern North Dakota (Leistritz and Coon 2009). The study authors felt that the Project Area was typical of Great Plains communities where many similar wind energy projects are being constructed. This study found that the 159-MW project resulted in a peak workforce of 269 workers during construction, 10 permanent jobs, and $1.4 million in ongoing annual expenditures to local businesses and households. This includes payments to landowners totaling $413,000 the first year, annual local property taxes to the County and school district, and direct payments for wages and materials in Cavalier County and adjacent counties. On a per-megawatt basis, the project's economic impacts were $8,900 in local expenditures per year; $2,600 per year in landowner payments; and $2,900 per year in property taxes.

Direct spending by Sunflower will have a multiplier effect as directly spent funds get distributed and re-distributed throughout the economy. The Leistritz and Coon study indicated that for every dollar of direct expenditures, nearly 3 dollars of indirect spending would occur.

At other wind farms, the public has expressed concerns over potential devaluation of property in and adjacent to proposed wind projects. A study published in October 2002, "Economic Impacts of Wind Power in Kittitas County, Final Report," conducted by Dr. Stephen Grover of ECONorthwest of Portland, OR, summarized survey results as follows:

> Views of wind turbines will not negatively impact property values. Based on a nationwide survey conducted of tax assessors in other areas with wind power projects, we found no evidence supporting the claim that views of wind farms decrease property values (Grover 2002, p.2).

More recently, the Lawrence Berkeley National Laboratory conducted two multi-year studies on the impact of wind power projects on residential property values in the U.S. (Hoen et al 2009, 2013). Both studies included literature review, data collection for residential sales transactions at multiple study areas, visit to each home to measure turbine visibility and quality of scenic vista, use of multiple statistical models. The studies concluded that:

- There was no statistical evidence that homes sold after announcement or construction of wind facilities have reduced property values;
- There was no statistical difference in sales price between homes with a view of wind turbines and homes without such views; and

- There was no statistical difference in sales price between homes within one mile of wind turbines and homes outside of 5 miles or that had been sold prior to facility announcement.

Other Potential Impacts

It is likely that sufficient skilled labor is available in the general area to serve the basic infrastructure and site development needs of the Project. Specialized labor from outside the local area will be required for certain components of wind farm construction.

No effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities in Bismarck or Dickinson. Available socioeconomic data indicates that adequate vacant housing would be available in those cities for the construction workforce. Operation and maintenance of the facility will employ from 10-12 maintenance staff; these are expected to largely be existing residents of the area

Local businesses such as motels, restaurants, bars, gas stations, and grocery stores would likely experience some increase in revenue resulting from new employment of the non-resident portion of Project construction crews. In particular, the consumption of goods, services, and temporary lodging in and near Bismarck, Hebron, Glen Ullin, Dickinson, Richardton, and surrounding cities could be expected to minimally increase due to the presence of these non-native workers. Other local area businesses that may benefit through increased sales would likely include ready-mix concrete and gravel suppliers, hardware and general merchandise stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance services.

This relatively small increase in demand for local goods and services would be minimal due to the small size of the non-local workforce and the short-term nature of the construction phase of the Project. For the same reasons, the effects to infrastructure such as schools, hospitals, housing, and utilities would also be minimal.

4.12 Environmental Justice

4.12.1 Existing Conditions

The goal of environmental justice is to ensure the fair treatment and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of potentially adverse human health and environmental effects of a federal agency action, operation, or program. Meaningful involvement means that affected populations have the opportunity to participate in the decision process and their concerns are considered.

Executive Order (E.O.) 12898 was signed by President Clinton in 1994 and orders federal agencies to identify and address “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.”

The analysis of potential environmental justice issues associated with the Project followed guidelines described in the CEQ's Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997). The analysis method has three parts: (1) the geographic distribution of low-income and minority populations in the affected area is described; (2) an assessment of whether the impacts of construction and operation of the Project would produce impacts that are high and adverse is conducted; and (3) if impacts are high and adverse, a determination is made as to whether these impacts would disproportionately impact low-income or minority populations.

The description of the geographic distribution of low-income and minority population groups was based on demographic data from the 2010 Census. According to the guidance (CEQ 1997), low-income populations in an affected area should be identified with poverty thresholds from the Census Bureau. The Block Groups in which the Project Area is located were chosen as the environmental justice analysis area, because most of the impacts (e.g., land use, noise, and visual) would be felt there, and because economic data is not available at the block level. The Analysis Area is located in Block Group 2 of Tract 205 in Morton County, and Block Group 2 of Tract 9633 in Stark County. The counties as a whole and the state of North Dakota were selected as comparison areas. The low income population percentages are based on household income as reported in the 2010 Census. The Analysis Area has a low-income household population of 8.66 percent, compared to 8.05 percent for Morton County, 11.54 percent for Stark County, and 12.71 percent for the state as a whole (see Table 12).

"Minority" is defined as individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. The CEQ guidance states that minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For this analysis, the number of white alone, not Hispanic individuals in the analysis area was subtracted from the total population for the minority population, since the Census also includes the Native Hawaiian and Pacific Islander, Other, and Two or more races categories. The minority population in 2010 in the Project Area was 3.90 percent, compared to 7.93 percent for Morton County, 6.85 percent for Stark County, and 12.23 percent in the state.

Table 12. Minority and Low-Income Populations, 2010 Census

Location	Total Population	Percent Minority	Percent of Households Below Poverty
Block Group 2, Tract 9633, Stark County	1,275	2.55%	7.84%
Block Group 2, Tract 205, Morton County	3,643	4.88%	9.28%
Stark County	24,199	6.85%	11.54%
Morton County	27,471	7.93%	8.05%
State of North Dakota	672,591	12.23%	12.71%

Source: U.S. Census Bureau, Census 2010, Summary File 1, Table P4 and Summary File 3, Table P87.

The analysis area does not contain either a concentrated minority population or a concentrated low-income population that would indicate an environmental justice concern. The percentage of minority persons in the analysis area is lower than in either Stark or Morton counties as a whole, and lower than the statewide percentage. Similarly, the percentage of low-income households in the analysis area is lower than the percentage in Stark County as a whole and lower than the statewide percentage, and not substantially higher (not greater than 30% higher) than the percentage in Morton County as a whole. Neither the minority nor the low-income household percentages exceed 50% in the analysis area, either of the counties, or the state as a whole.

4.12.2 Potential Impacts

With regard to EO 12898, an impact would be considered significant if a low-income or minority population was disproportionately affected by the Project.

There is no indication that any minority or low-income population is concentrated within or near the Project Area, or that any adverse impact would occur in an area occupied primarily by any minority group. The Project Area block groups do not have a significantly higher percentage of persons below the poverty level compared to the respective counties or the state, and have a lower minority population percentage than the respective counties and the state. The Project impacts do not appear to be high and adverse, and therefore no determination was made regarding whether the low-income and minority populations would be disproportionately affected by the Project. The Proposed Action will not have significant adverse environmental justice impacts.

4.13 Land Use/Farmland

4.13.1 Existing Conditions

The land within the Project Area is entirely in private ownership. The Project Area is in agricultural use including crops and livestock grazing, with scattered farmstead residences.

The Project Area is not located within any city limits or any military installation. There are no industrial developments in or near the Project Area, with the exception of Western's Dickinson-Mandan 230 kV transmission line and several communication towers. U.S. Interstate Highway 94 runs east-west just north of the northern boundary of the Project Area. The roads within the Project Area include gravel surfaced county roads and two-track farm access roads and trails.

County Land Use Regulation

The Project is subject to land use regulation by Morton and Stark Counties; the Project Area is zoned for Agricultural use under both the Morton County and the Stark County zoning regulations.

Under the Morton County Zoning Regulations (MCZR; March 2013), the construction of a wind energy facility in the Agricultural District requires a Special Use Permit (MCZR Article 5, Section 4.27). The Morton County Zoning Regulations include specific provisions for wind turbines in Appendix I, Wind Energy Facilities, including defined setbacks as follows:

- Each wind turbine is to be set back a distance of at least 1.25 times its total height or 1,320 feet, whichever is greater, from occupied residences, commercial buildings or publicly used structures or facilities, or state and county parks.
- Each wind turbine is to be set back from public Interstate, state, county, or township roads and above-ground communication or electrical lines or railroad right-of-way a distance of not less than 250 feet from the centerline of the existing right-of-way.
- Each wind turbine is to be set back from the perimeter of the facility by a distance not less than one to one and one half (1 to 1 ½) times the rotor diameter; a variance may be granted if the owners/residents of adjoining properties sign a formal and binding agreement with the applicant, expressing support for a variance that may reduce the perimeter setback requirement.

In addition, buildings are to be set back a minimum of 60 feet from the right-of-way line of county roads and state or federal highways (MCZR Article 18).

MCZR Appendix I also includes provisions and requirements for siting of turbines to avoid or minimize impacts to environmental resources, requirements for restoration of temporary disturbance areas, and requirements for removal of facility infrastructure at the time of decommissioning. These requirements would be satisfied through the implementation of impact avoidance and minimization measures and BMPs as identified in the Draft UGP Wind Energy PEIS, as listed below.

Additional administrative permits would be needed for construction of the Project in Morton County, as follows:

- Building permits would be needed, and structures must comply with the North Dakota State Building Code and any future amendments or revisions to that code (MCZR Article 20).
- Construction within a mapped 100-year floodplain would require a floodplain development permit to be issued by the County Building Inspector (MCZR Article 12).
- A Stormwater Management Plan must also be approved by the County Engineer for any building permit or land disturbing activity (MCZR Article 21).

In Stark County, a wind energy facility may be approved through the issuance of a Wind Energy Facility Siting Permit (Stark County Zoning Ordinance [SCZO] Section 6.19.2). The permit would be issued by the Planning and Zoning Commission, following public hearings by both the Planning and Zoning Commission and the County Commissioners. The SCZO, Section 6.19 includes specific provisions for wind energy facilities, including defined setbacks as follows:

- Each wind turbine is to be set back not less than 2,000 feet from occupied dwellings, commercial buildings or publicly-used structures or facilities;
- Each wind turbine is to be set back not less than 200 feet from the centerline of public roads and above-ground communication and electrical lines;
- Each turbine is to be set back a distance of not less than 2.5 times the rotor diameter from the facility perimeter. A variance may be granted if the owners/residents of

adjoining properties sign a formal and binding agreement with the applicant, expressing support for a variance that waives or reduces the perimeter setback requirement.
- Buildings must be set back a minimum of 125 feet from the centerline of county roads or from section lines (SCZO Sec 3.7).

Additional administrative permits would be needed for construction of the Project in Stark County.

- Building permits would be needed, and structures must comply with the North Dakota State Building Code, the International Building Code, the International Mechanical Code, and the State Uniform Plumbing Code, and any future amendments or revisions to those codes.
- Construction within a mapped 100-year floodplain would require a permit to be issued by the Code Administrator.

The Stark County Zoning Ordinance, Section 6.19 also includes provisions and requirements for siting of turbines to avoid or minimize impacts to environmental resources, requirements for restoration of temporary disturbance areas, and requirements for removal of facility infrastructure at the time of decommissioning. These requirements would be satisfied through the implementation of impact avoidance and minimization measures and BMPs as identified in the Draft UGP Wind Energy PEIS, as listed above for Morton County.

State Land Use Regulation

Pursuant to the North Dakota Energy Conversion and Transmission Facility Siting Act (North Dakota Century Code [NDCC] Chapter 49-22), a Certificate of Site Compatibility must be issued by the ND Public Service Commission (PSC) prior to the construction of the Project. Sunflower will apply for the Certificate in a separate filing. Siting criteria are established in the North Dakota Administrative Code (NDAC) Chapter 69-06-08 including exclusion and avoidance areas. Required setback exclusion areas include the following:

- 1.1 times the height of the turbine from interstate or state roadway right-of-way;
- 1.1 times the height of the turbine plus 75 feet from the centerline of county or township roads;
- 1.1 times the height of the turbine from any railroad right-of-way;
- 1.1 times the height of the turbine from any transmission line of 115 kV or higher capacity;
- 1.1 times the height of the turbine from the property line of a nonparticipating landowner, unless a variance is granted; a variance may be granted if the owners/residents of adjoining properties sign a formal and binding agreement with the applicant, expressing support for a variance that may reduce the perimeter setback requirement.

Sunflower will incorporate these setbacks and all of the required exclusion and avoidance areas into the final design.

Easements and Other Protected Lands

Land in North Dakota may be protected through a variety of conservation easements including the following:

USFWS Wetland and Grassland Easements

The USFWS has been purchasing wetland easements in the Prairie Pothole Region since 1989. Easement wetlands are part of the National Wildlife Refuge System. There are no USFWS wetland easements in the Project Area or in Morton or Stark counties (NCED 2013).

Conservation Reserve Program Easements

The USDA-Natural Resource Conservation Service (NRCS) and Farm Service Agency (FSA) administer a number of conservation-based programs for private landowners. The Conservation Reserve Program (CRP) conserves soil and water resources and provides wildlife habitat by removing enrolled tracts from agricultural production, generally for a period of 10 years. The NRCS administers a number of conservation-based programs for private landowners. These tracts cannot be hayed, tilled, seeded, or otherwise disturbed without the authorization of the NRCS. The 2002 Farm Bill amended Section 3832 of the Farm Security and Rural Investment Act to allow the use of CRP land for wind energy generation.

According to the FSA, there are a total of 6,436.2 acres of land in Morton County and 30,946.8 acres of land in Stark County currently enrolled in the CRP; some of these lands may occur in the Project Area. Sunflower will work with landowners within the Project Area to determine if any lands are enrolled in CRP; should any CRP lands be identified, Sunflower will avoid those areas to the extent practicable during micrositing; if avoidance is not practical, Sunflower will work with the landowner and USDA to determine an appropriate course of action.

USDA Loan Coordination

The USDA offers a variety of loans through its Rural Development program. Land under loans from the USDA requires special coordination with the USDA if non-agricultural project activities are proposed within those parcels; this coordination can include a modified National Environmental Policy Act (NEPA) review. The Project Area may include some lands that have used USDA loads and are therefore subject to USDA review. Sunflower will work with landowners within the Project Area to determine if any lands are under USDA jurisdiction due to loans. Should any loan coordination lands be identified, Sunflower will work with the landowner and USDA to determine appropriate avoidance or minimization measures, if necessary.

Private Land Open to Sportsmen

The NDGFD runs the Private Land Open to Sportsmen (PLOTS) program, under which private lands may be opened to public hunting use. These lands are enrolled in one of three NDGFD programs to enhance fish and wildlife populations for sustained public use, and may also be jointly enrolled in other federal programs such as the Conservation Reserve Program described below. No PLOTS parcels are located within the Project Area. Several PLOTS parcels are located near the southwestern corner of the Project Area (see Figure 2); these PLOTS lands would not be impacted by the Project.

Wildlife Management Areas

Wildlife Management Areas (WMAs) are state-owned lands managed by the NDGFD for wildlife habitat. There are no WMAs in or near the Project Area. The closest is the Storm Creek WMA in Morton County located approximately 18 miles east of the Project Area.

The Heart Butte Reservoir State Game Management Area is not a WMA, but is managed by the NDGFD for fishing and hunting. This game management area is located approximately 16 miles southeast of the Project Area.

Waterfowl Management Districts

Waterfowl Management Districts (WMDs) are lands purchased by the U.S. Bureau of Reclamation (Reclamation) as part of North Dakota’s Garrison Diversion Unit. Reclamation developed these areas for wildlife by restoring drained wetlands and planting cropland acres to grassland. The WMDs were transferred to the USFWS to be managed primarily for the production of migratory birds and for public use. The closest WMD is located approximately 21 miles southwest of the Project Area in Hettinger County.

State Trust Lands

There are no state trust lands within the Project Area.

Federal Lands

There are no federally-owned or managed lands within the Project Area.

Tribal Lands

There are no tribally-owned or managed lands within the Project Area.

4.13.2 Potential Impacts

A significant land use impact would occur if: 1) the Project resulted in the uncompensated loss of crop production; or 2) the Project resulted in the foreclosure of future land uses.

Direct Impacts

Direct impacts to land use would include the permanent loss of agricultural production in areas used for turbine foundations, permanent access roads, the Project O&M facility, and the Project substation and interconnection switchyard. These permanent impacts would total up to 45 acres for the Proposed Action.

Direct impacts would also include the temporary disturbance associated with temporary construction areas at each turbine, the underground collection system, access road areas used during construction and then reclaimed, and the construction laydown area. These temporary impacts would total up to approximately 251 acres for the Proposed Action.

Sunflower will work closely with landowners to locate access roads and other Project components so as to minimize impact on current or future agricultural operations. Temporary impact areas will be restored following completion of construction in consultation with landowners and agencies.

Following completion of the Project, the area would retain its rural and agricultural character. The development of the Project will not result in a significant change in land use or agricultural practices. Agricultural practices would continue unchanged on the vast majority of the Project Area not occupied by Project facilities. The minor economic loss to agricultural operations will be compensated through lease payments from Sunflower.

The development of the Project will not displace any residents or existing or planned industrial facilities. Wind turbines will be sited a minimum of 1,320 feet from occupied residences in Morton County and 2,000 feet from occupied residences in Stark County, in accordance with the requirements of the respective county zoning regulations. Setbacks to roads as established by county and state regulations would be observed. Setbacks to non-participating lands will also be observed, unless Sunflower is able to secure landowner agreements and appropriate waivers or variances.

The Project would not impact any wetland easements or wetlands management districts, PLOTS lands, or wildlife management areas.

If Project facilities are proposed for parcel enrolled in CRP and it is not practical to move such facilities, Sunflower will work with landowners to determine whether the parcel should be removed from the program and if reimbursement is necessary.

During final Project design, Sunflower will observe the exclusion and avoidance areas as established in NDAC Chapter 69-06-08. These will be addressed in detail in the application for a Certificate of Site Compatibility.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no impacts to land use. This work would occur entirely within the existing transmission right-of-way and would utilize existing access roads and other previously-disturbed areas.

Indirect Impacts

The Project would have no indirect effects on agricultural practices or land uses in the area.

Avoidance, Minimization and Best Management Practices

Sunflower will implement avoidance and minimization measures and BMPs as identified in the Draft UGP Wind Energy PEIS to limit impacts on land use and agricultural practices (see PEIS section 5.1.1), as follows:

- Project developers shall contact appropriate agencies, property owners, tribes, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, identify pre-Project surveys or data collection needs, and identify rules that govern wind energy development locally, as well as land use concerns specific to the region. Project developers should coordinate closely with the Service and the U.S.

Department of Agriculture (USDA) during initial project planning to ensure that wetland and grassland easements are avoided to the extent practicable.

- Consult with the Department of Defense (DOD) during initial project planning to evaluate impacts of a proposed project on military operations in order to identify and address any DOD concerns.
- The Federal Aviation Administration (FAA) required notice of proposed construction shall be made as early as possible to identify any air safety measures that would be required.
- Avoid locating wind energy developments in areas of unique or important recreation, wildlife, or visual resources. When feasible, a wind energy development should be sited on already altered landscapes.
- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.
- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.
- Projects shall be designed to utilize existing roads and utility corridors to the maximum extent feasible, and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.
- Prior to start of construction, a monitoring plan shall be developed by the project developers so that environmental conditions are monitored during the construction, operation, and decommissioning phases. The monitoring plan shall be submitted to the Service and shall identify the monitoring requirements for important environmental conditions present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring results and additional mitigation measures into standard operating procedures and BMPs for the project.
- “Good housekeeping” procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash, or waste; to prohibit scrap heaps and dumps; and to minimize storage yards.
- An access road siting and management plan shall be prepared incorporating applicable standards regarding road design, construction, and maintenance. Access roads will be designed to minimize total length, avoid wetlands, and avoid and minimize stream and drainage crossings.
- Avoid locating wind energy developments in areas of unique or important recreation, wildlife, or visual resources. When feasible, a wind energy development should be sited on already altered landscapes.
- Consolidate infrastructure wherever possible to maximize efficient use of the land and minimize impacts. Existing transmission and market access should be evaluated and use of existing facilities should be maximized.
- Develop restoration plans to ensure that all temporary use areas are restored.
- Construction debris should be removed from the site.

- Excess concrete (excluding belowground portions of decommissioned turbine foundations intentionally left in place) should not be buried or left in active agricultural areas.
- Vehicles should be washed outside of active agricultural areas to minimize the possibility of the spread of noxious weeds.
- Topsoil should be stripped from any agricultural area used for traffic or vehicle parking—segregating topsoil from excavated rock and subsoil—and replaced during restoration activities.
- Drainage problems caused by construction should be corrected to prevent damage to agricultural fields.
- Following completion of construction and during decommissioning, subsoil should be decompacted (Brower 2005).
- Coordinate closely with the Service or USDA during initial project planning to ensure that wetland and grassland easements are avoided to the extent practicable.

Additional site-specific measures to further reduce impacts to land use may be identified and implemented as appropriate; however, impacts to land use are not expected to be significant.

4.14 Visual Resources

This section evaluates the existing visual setting in the vicinity of the Project and potential Project impacts. The visual study area included areas within and adjacent to the Project Area from which a person may be able to observe changes to the visual landscape resulting from development of the Project. Scenic quality is determined by evaluating the overall character and diversity of landform, vegetation, color, water, and cultural or manmade features in a landscape. Typically, more complex or diverse landscapes have higher scenic quality than those landscapes with less complex or diverse landscape features.

Visual sensitivity is dependent on viewer attitudes, the types of activities in which people are engaged when viewing the site, and the distance from which the site will be seen. Overall, higher degrees of visual sensitivity are correlated with areas where people live, are engaged in recreational outdoor pursuits, or participate in scenic or pleasure driving.

4.14.1 Existing Conditions

The visual setting of the Project Area consists primarily of agricultural land. The Project Area lies in a rural location with farming, livestock grazing, and related agricultural operations dominating land use. There is an existing 230 kV transmission line crossing the Project Area, and an interstate highway, U.S. Highway 94, a short distance to the north. The visual resources of the area are neither unique to the region nor entirely natural.

Structure and color features in the visual region of influence include those associated with cultivated cropland, pasture, forested shelterbelt, wetlands, and additional human-caused features described above. Colors vary seasonally and include green crop and pasture land during spring and early summer, green to brown crops and pasture during late summer and fall, brown and black associated with fallow farm fields year round, and white and brown associated with late fall and winter periods.

No distinctive landscape features exist in the Project Area that would require specific protection from visual impairment. There are no Federal lands; national parks, monuments or recreation areas; national historic sites, parks or landmarks; national memorials or battlefields; national wild and scenic rivers; national historic trails, national scenic highways, national wildlife refuges, or other designated national scenic resources within 20 miles of the Project Area. There are also no state parks, no county parks, and no locally designated scenic resources in the vicinity of the Project Area. The one State Trust Land parcel located in the Project Area for the Proposed Action is not known to contain designated scenic resources.

Existing views are primarily of agricultural activity, undeveloped land, existing energy transmission facilities, and vehicles traveling on U.S. Highway 94; State Highway 10, and low-traffic county and private roads. There are currently no other utility-scale wind energy facilities close to the Project Area; the nearest existing wind farm, Bison Wind, is located approximately 15 miles to the northeast in Morton and Oliver counties, ND (OpenEI 2013). Approximately 21 cellular communications, microwave and radio towers are located within 10 miles of the Project Area; six of these are located within the Project Area, and most of the remaining towers are located atop a hill (Custer's Lookout) about 1.5 miles west of the Project Area (see Appendix D, Microwave Beam Path Study).

The principle viewers include local residents living inside the Project Area, residents of the scattered farmsteads near the Project Area, residents of the towns of Hebron, Glen Ullin and Richardton, and travelers on U.S. Highway 94 or on local roads. For the Proposed Action, six occupied residences have been identified within the Project Area, with another five additional occupied residences located within one mile of the Project Area boundary (see Figure 10). All residences within the Project Area are owned by Project participants. No concerns about visual impacts were raised during the August 2013 Scoping Meeting or in agency and public comments.

4.14.2 Potential Impacts

Direct Impacts

Construction and operation of the Project would introduce visual contrasts, primarily from the presence of the wind turbines and Project substation and interconnection switchyard, and secondarily from the Project access roads. During construction and decommissioning, construction equipment, especially cranes, would introduce temporary impacts during the construction period.

The Project wind turbines would have nighttime lighting in conformance with FAA guidelines. The FAA is expected to require red flashing marker lights on turbines at the perimeter of the Project Area and on select turbines within the Project such that the gap between lights is no greater than 0.5 miles. The FAA may also require white or off-white coloring of the wind turbines for daytime visibility.

Viewer reactions to the Project would be both subjective and site- and time-specific because of the subjective and experiential nature of human visual perception and cognition in the assessment of the magnitude and importance of perceived visual impacts (Hankinson 1999, University of Newcastle 2002; both cited in the Draft UGP Wind Energy PEIS). The perception of visual impacts is highly dependent not only on physical factors that affect what and how the impacts are seen, but also on the number and type of viewers, their sensitivity to the visual environment, their personal preferences and attitudes, and other cultural factors that concern both the viewer and the affected landscape (Benson 2005, BLM 1984, DTI 2005, University of Newcastle 2002, USFS 1995; all cited in the Draft UGP Wind Energy PEIS).

The potential visual impacts of wind energy development are discussed in detail in the Draft UGP Wind Energy PEIS. The Draft PEIS describes key findings and methodologies from a number of visual impact studies, and concludes that “Based on these empirical studies, it is reasonable to expect that within the UGP Region, assuming good visibility, a wind farm with wind turbines approximately 400 feet (122 m) in overall height could be visible from approximately 25 mi (40 km) or farther, and could potentially cause large visual contrasts at distances less than 7–8 mi (11–13 km), and more moderate impacts up to approximately 15 mi (24 km), with smaller visual impacts beyond approximately 15 mi (24 km).”

Impacts on residents are generally greater than those on more transient viewers, such as drivers or workers, in part because residents are likely to view wind energy facilities more frequently and for longer durations. However, a number of studies have shown that residing close to a wind energy facility does not necessarily negatively affect residents’ perception of visual impacts (Krohn and Damborg 1999; Warren et al. 2005, both cited in the Draft UGP Wind Energy PEIS).

In one of the few studies addressing public acceptance of wind power and perceptions of visual impact in the UGP Region, Sowers (2006, cited in the Draft UGP Wind Energy PEIS) noted that a large number of project sites in the region had no significant opposition, which was attributed in part to the region’s inhabitants regarding wind turbines as a source of income and as being compatible with their perceptions of wind energy facilities providing a “working” agricultural landscape. Most residents he interviewed indicated that they did not view the visual impacts negatively, viewing wind turbines in some cases as “another piece of farm machinery.”

Overall, the introduction of the Project is not anticipated to be perceived as a negative visual impact by residents in and near the Project Area, most or all of whom are Project participants. For residents outside of the Project Area but within view of the Project, or for travelers, the Project is unlikely to introduce sufficient visual contrast to create significant impacts given the presence of existing wind farms in the area and the general acceptance of wind projects in the surrounding communities.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would not create additional visual impacts. This work would utilize the existing transmission support towers and would not require the development of additional structures, access roads, or other disturbance areas. Visual impacts would be limited to the temporary presence of construction equipment.

Shadow Flicker

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomenon experienced by people at nearby residences or public gathering places. The impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typical during sunrise and sunset.

Shadow flicker intensity for receptor-to-turbine distances beyond 1,500 meters (4,921 feet) is very low and generally considered imperceptible. Shadow flicker intensity for receptor-to-turbine distances between 1,000 and 1,500 meters (between 3,281 and 4,921 feet) is also low and considered barely noticeable. At this distance shadow flicker intensity would only tend to be noticed under conditions that would enhance the intensity difference, such as observing from a dark room with a single window directly facing the turbine casting the shadow.

The British Epilepsy Foundation states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz. Since the Project's wind turbine blade pass frequency is approximately 0.9 Hz (less than 1 alternation per second), no negative health effects to individuals with photosensitive epilepsy are anticipated.

Shadow flicker impacts are not regulated in applicable state or federal law, and there is no permitting trigger or established threshold of significance with regard to hours per year of anticipated shadow flicker impacts to a receptor from a wind energy project.

In Morton County, turbines must be at least 1,320 feet from occupied residences, and Stark County requires a setback of 2,000 feet from occupied residences. The observance of these setback requirements would minimize potential impacts from shadow flicker. A shadow flicker analysis will be completed for the application to the NDPSC for a Certificate of Site Compatibility; the results of this study will be used in the final micrositing of the turbines.

Avoidance, Minimization and Best Management Practices

Significant impacts to visual resources are not anticipated. The Project Area does not contain any highly distinctive or important landscape features or unique viewsheds. In addition, there are no visual quality standards in place within Stark and Morton counties.

Sunflower will implement measures as identified in the Draft UGP Wind Energy PEIS to reduce visual impacts of the Project, to the extent that they can be reduced (see PEIS section 5.7.1.3), as follows:

Measures Related to Project Design:

- Because the landscape setting observed from national historic sites, national trails, and tribal cultural resources may be a part of the historic context contributing to the historic significance of the site or trail, project siting should avoid locating facilities that would alter the visual setting such as would reduce the historic significance or function.

- Where possible, projects should be sited outside the viewsheds of Key Observation Points (KOPs), highly sensitive viewing locations, and/or areas with limited visual absorption capability and/or high scenic integrity. When wind energy developments and associated facilities must be sited within view of KOPs, they should be sited as far away as possible, since visual impacts generally diminish as viewing distance increases.
- Where possible, developments should be sited in already industrialized and developed landscapes, with due consideration for visual absorption capacity and possible cumulative effects.
- Siting should take advantage of both topography and vegetation (where possible) as screening devices to restrict views of projects from visually sensitive areas.
- The eye is naturally drawn to prominent landscape features (e.g., knobs and waterfalls); thus, projects and their elements should not be sited next to such features, where possible.
- The eye naturally follows strong natural lines in the landscape, and these lines and associated landforms can “focus” views on particular landscape features. For this reason, linear facilities associated with a wind energy project, such as transmission lines and roads, generally should not be sited so that they bisect ridge tops or run down the center of valley bottoms.
- Although wind turbines may sometimes be located on ridgelines, skylining of substations, transmission structures, communication towers, and other structures associated with wind energy developments should be avoided; that is, they should not be placed on ridgelines, summits, or other locations where they will be silhouetted against the sky from important viewing locations. Siting should avoid skylining by taking advantage of opportunities to use topography as a backdrop for views of facilities and structures. The presence of these structures should be concealed or made less conspicuous by siting and designing them to harmonize with desirable or acceptable characteristics of the surrounding environment.
- Wind turbines should be sited properly to eliminate shadow flicker effects on nearby residences or other highly sensitive viewing locations, or reduce them to the lowest achievable levels, as calculated using appropriate siting software and procedures. Accurately determined shadow flicker estimates should be made available to stakeholders in advance of project approval. If turbine locations are changed during the siting process, shadow flicker effects should be recalculated and made available to potentially affected stakeholders.
- Spatially accurate and realistic photo simulations of wind turbines in the proposed location should be prepared as part of the siting process. Simulations should show views from sensitive visual resource areas; highly sensitive viewing locations, such as residences; and more representative typical viewing locations. Stakeholders should be involved in selecting KOPs for simulations. Where feasible, simulations should portray a range of lighting conditions and sun angles. Simulations should be based on accurate spatial information, particularly elevation data, and must account for screening vegetation and structures. Simulations should show enough of the surrounding

landscape to show the project in the appropriate spatial context and should be reproduced at a large enough size to be comfortably viewed from the appropriate specified distance to accurately depict the apparent size of the facility in a real setting.

- As feasible, siting of linear features (ROWs and roads) associated with wind energy developments should follow natural land contours rather than straight lines, particularly up slopes. Fall-line cuts should be avoided. Where it can be accomplished without introducing unacceptable impacts on other resources, following natural contours echoes the lines found in the landscape and often reduces cut-and-fill requirements; straight lines can introduce conspicuous linear contrasts that appear unnatural.
- Siting of facilities, especially linear facilities, should take advantage of natural topographic breaks (i.e., pronounced changes in slope), and siting of facilities on steep side slopes should be avoided. Facilities sited on steep slopes are often more visible (particularly if either the project or viewer is elevated); in addition, they may be more susceptible to soil erosion, which could contribute to negative visual impacts.
- In forested areas or shrublands, where possible, linear facilities should follow the edges of clearings (where they would be less conspicuous) rather than pass through their center.
- Because visual impacts are usually lessened when vegetation and ground disturbances are minimized, where possible, in forested areas or shrublands, siting should take advantage of existing clearings to reduce vegetation clearing and ground disturbance.
- Locations for transmission line and ROW road crossings of other roads, streams, and other linear features within a corridor should be chosen to avoid KOP viewsheds and other visually sensitive areas and to minimize disturbance to vegetation and landforms. The ROWs should cross linear features (e.g., trails, roads, and rivers) at right angles whenever possible to minimize the viewing area and duration.
- To the extent possible, transmission lines and roads associated with wind energy facilities should be collocated within a corridor to use existing/shared ROWs, existing/shared access and maintenance roads, and other infrastructure in order to reduce visual impacts associated with new construction.

Measures directed at minimizing vegetation and ground disturbance to lessen associated visual impacts:

- Wind turbine siting should be sensitive to and respond to the surrounding landscape in a visually pleasing way. For example, in rolling landscapes, a less rectilinear and rigid configuration of turbines that follows local topography may be appropriate. In flatter agricultural landscapes with rectilinear patterns of road and fields, a more geometric or linear wind turbine configuration may be preferred.
- To the extent possible, given the terrain of a site, wind turbines should be clustered or grouped when placed in large numbers, but a cluttering effect should be avoided by separating otherwise overly long lines of turbines or large arrays, and breaks or open zones should be inserted to create distinct visual units or groups of turbines.
- Project design should provide visual order and unity among clusters of turbines (visual units) to avoid visual disruptions and perceived “disorder,disarray, or clutter.”

- Wind turbines should exhibit visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers.
- Power collection cables or lines on the site should be buried in a manner that minimizes additional surface disturbance (e.g., collocating them with access roads).
- For ancillary buildings and other structures, low-profile structures should be chosen whenever possible to reduce their visibility.
- Where screening topography and vegetation are absent, natural-looking earthwork berms and vegetative or architectural screening should be used to minimize visual impacts associated with ancillary facilities. Vegetative screening can be particularly effective along roadways.
- The siting and design of facilities, structures, roads, and other project elements should match and repeat the form, line, color, and texture of the existing landscape.
- In forested areas and shrublands, openings in vegetation for facilities, structures, roads, etc., should mimic the size, shape, and characteristics of naturally occurring openings to the extent possible.
- Through site design, the number of structures required should be minimized. Activities should be combined and carried out in one structure, or structures should be collocated to share pads, fences, access roads, lighting, etc.
- Structures and roads should be designed and located to minimize and balance cuts and fills. Reducing cut and fill has numerous visual benefits, including fewer fill piles, landforms and vegetation that appear more natural, fewer or reduced color contrasts with disturbed soils, and reduced visual disturbance from erosion and the establishment of invasive species.
- Facilities, structures, and roads should be located in stable fertile soils to reduce visual contrasts from erosion and to better support rapid and complete regrowth of affected vegetation. Site hydrology should also be carefully considered in siting operations to avoid visual contrasts from erosion. Strip, stockpile, and stabilize topsoil from the site before excavating earth for facility construction.
- The vegetation-clearing design in forested areas should include the feathering of cleared area edges (i.e., the progressive and selective thinning of trees from the edge of the clearing inward) combined with the mixing of tree heights from the edge to create an irregular vegetation outline. These actions would result in a more natural-appearing edge, thereby avoiding the very high linear contrasts associated with straight-edged, clear-cut areas.
- Structures, roads, and other project elements should be set as far back from road, trail, and river crossings as possible, and vegetation should be used to screen views from crossings, where feasible.

Measures Related to Building and Structural Materials:

- The use of monopole structures is recommended. Truss or lattice-style wind turbine structures with lacework or pyramidal or prismatic shapes should be avoided. Monopole structures present a simpler profile, and less complex surface characteristics and reflective/shading properties.

- Subject to FAA or other regulations, color selections for turbines should be made to reduce visual impact and should be applied uniformly to tower, nacelle, and rotor, unless gradient or other patterned color schemes are used.
- Grouped structures should all be painted the same color to reduce visual complexity and color contrast.
- For ancillary structures, materials and surface treatments should repeat and/or blend with the existing form, line, color, and texture of the landscape. If the project will be viewed against an earthen or other non-sky background, appropriately colored materials should be selected for structures, or appropriate stains/coatings should be applied to blend with the project's backdrop.
- The operator should use nonreflective paints and coatings on wind turbines, visible ancillary structures, and other equipment to reduce reflection and glare.
- Turbines, visible ancillary structures, and other equipment should be painted before or immediately after installation.
- For ancillary facilities, multiple-color camouflage technology applications should be considered for projects within sensitive viewsheds and with a visibility distance between 0.25 to 2 mi (0.4 to 3.2 km).
- Electricity transmission projects associated with wind energy facilities should utilize nonspecular conductors and nonreflective coatings on insulators.
- For transmission structures, monopoles may reduce visual impacts more effectively than lattice structures in foreground and middle-ground views, while lattice structures may be more appropriate for more distant views, where the latticework would "disappear," allowing background textures to show through.
- Lighting for facilities should not exceed the minimum required for safety and security, and full-cutoff designs that minimize upward light scattering (light pollution) should be selected. If possible, site design should be accomplished to make security lights nonessential. Such lights increase the contrast between a wind energy project and the night sky, especially in rural/remote environments common to UGP Region. Where they are necessary, security lights should be extinguished except when activated by motion detectors (e.g., only around the substation).
- Commercial messages and symbols (such as logos, trademarks) on wind turbines should be avoided and should not appear on sites or ancillary structures of wind energy

Measures Related to Construction:

- Where possible, staging and laydown areas should be sited outside the viewsheds of KOPs and not in visually sensitive areas; they should be sited in swales, around bends, and behind ridges and vegetative screens, where these screening opportunities exist.
- A site restoration plan should be in place prior to construction. Restoration of the construction areas should begin immediately after construction to reduce the likelihood of visual contrasts associated with erosion and invasive weed infestation and to reduce the visibility of affected areas as quickly as possible.
- Disturbed surfaces should be restored to their original contours as closely as possible and revegetated immediately after, or contemporaneously with, construction. Prompt

action should be taken to limit erosion and to accelerate restoring the preconstruction color and texture of the landscape.

- Visual impact mitigation objectives and activities should be discussed with equipment operators before construction activities begin.
- Penalty clauses should be used to protect trees and other sensitive visual resources.
- Existing rocks, vegetation, and drainage patterns should be preserved to the maximum extent possible.
- Valuable trees and other scenic elements can be protected by clearing only to the edge of the designed grade manipulation and not beyond through the use of retaining walls, and by protecting tree roots and stems from construction activities. Brush-beating or mowing rather than vegetation removal should be done, where feasible.
- Slash from vegetation removal should be mulched and spread to cover fresh soil disturbances (preferred) or should be buried. Slash piles should not be left in sensitive viewing areas.
- Installation of gravel and pavement should be avoided where possible to reduce color and texture contrasts with the existing landscape.
- For road construction, excess fill should be used to fill uphill-side swales to reduce slope interruption that would appear unnatural and to reduce fill piles.
- The geometry of road ditch design should consider visual objectives; rounded slopes are preferred to V-shaped and U-shaped ditches.
- Road-cut slopes should be rounded, and the cut/fill pitch should be varied to reduce contrasts in form and line; the slope should be varied to preserve specimen trees and nonhazardous rock outcroppings.
- Planting pockets should be left on slopes, where feasible.
- Benches should be provided in rock cuts to accent natural strata.
- Topsoil from cut/fill activities should be segregated and spread on freshly disturbed areas to reduce color contrast and aid rapid revegetation. Topsoil piles should not be left in sensitive viewing areas.
- Excess fill material should not be disposed of downslope in order to avoid creating color contrast with existing vegetation/soils.
- Excess cut/fill materials should be hauled in or out to minimize ground disturbance and impacts from fill piles.
- Soil disturbance should be minimized in areas with highly contrasting subsoil color.
- Natural or previously excavated bedrock landforms should be sculpted and shaped when excavation of these landforms is required. A percentage of backslope, benches, and vertical variations should be integrated into a final landform that repeats the natural shapes, forms, textures, and lines of the surrounding landscape. The earthen landform should be integrated and transitioned into the excavated bedrock landform. Sculpted rock face angles, bench formations, and backslope need to adhere to the natural bedding planes of the natural bedrock geology. Half-case drill traces from pre-split blasting should not remain evident in the final rock face. Where feasible, the color contrast should be removed from the excavated rock faces by color-treating with a rock stain.

- Where feasible, construction on wet soils should be avoided to reduce erosion.
- Communication and other local utility cables should be buried, where feasible.
- Culvert ends should be painted or coated to reduce color contrasts with existing landscape.
- Signage should be minimized; reverse sides of signs and mounts should be painted or coated to reduce color contrasts with the existing landscape.
- The burning of trash should be prohibited during construction; trash should be stored in containers and/or hauled off-site.
- Litter must be controlled and removed regularly during construction.
- Dust abatement measures should be implemented in arid environments to minimize the impacts of vehicular and pedestrian traffic, construction, and wind on exposed surface soils.

Measures Related to Operations and Maintenance:

- Wind facilities and sites should be actively and carefully maintained during operation. Wind energy projects should evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power.
- Inoperative or incomplete turbines cause the misperception in viewers that “wind power does not work” or that it is unreliable. Inoperative turbines should be repaired, replaced, or removed quickly. Nacelle covers and rotor nose cones should always be in place and undamaged.
- Nacelles and towers should be cleaned regularly (yearly, at minimum) to remove spilled or leaking fluids and the dirt and dust that accumulates, especially in seeping lubricants.
- Facilities and off-site surrounding areas should be kept clean of debris, “fugitive” trash or waste, and graffiti. Scrap heaps and materials dumps should be prohibited and prevented. Materials storage yards, even if thought to be orderly, should be kept to an absolute minimum. Surplus, broken, disused materials and equipment of any size should not be allowed to accumulate.
- Maintenance activities should include dust abatement (in arid environments), litter cleanup, and noxious weed control.
- Road maintenance activities should avoid blading of existing forbs and grasses in ditches and adjacent to roads; however, any invasive or noxious weeds should be controlled as needed.
- Interim restoration should be undertaken during the operating life of the project as soon as possible after disturbances.

Measures Related to Decommissioning:

- All aboveground and near-ground structures should be removed.
- Soil borrow areas, cut-and-fill slopes, berms, waterbars, and other disturbed areas should be contoured to approximate naturally occurring slopes, thereby avoiding form and line contrasts with the existing landscapes. Contouring to rough texture would trap seed and discourage off-road travel, thereby reducing associated visual impacts.

- Cut slopes should be randomly scarified and roughened to reduce texture contrasts with existing landscapes and to aid in revegetation.
- Combining seeding, planting of nursery stock, transplanting of local vegetation within the proposed disturbance areas, and staging of construction should be considered, enabling direct transplanting. Generally, native vegetation should be used for revegetation, establishing a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape. Seed mixes should be coordinated with local authorities, such as country extension services, weed boards, or land management agencies.
- Gravel and other surface treatments should be removed or buried.
- Rocks, brush, and forest debris should be restored, whenever possible, to approximate preexisting visual conditions.

Additional site-specific measures to further reduce visual impacts may be identified and implemented as appropriate; however, impacts to visual resources are not expected to be significant. The most heavily impacted residents in the area would be Project participants, none of whom have expressed concerns related to visual impacts. Should complaints arise, Sunflower will address them on a case-by-case basis.

4.15 Noise

Noise is generally defined as unwanted or excessive sound. Sound is produced by wind energy facility equipment including the turbines and substation and interconnection switchyard equipment, as well as by the interaction of the wind with the turbine blades.

Perceived noise level, and the potential for resulting disturbance, is a function of both the sound in question and the level of background sound. Background sound levels will vary both spatially and temporally depending on proximity to area sound sources such as agricultural equipment, traffic on nearby roadways or railways, and natural sounds such as birds or vegetation rustling in the wind. Diurnal effects result in sound levels that are typically quieter during the night than during the daytime, except during periods when evening and nighttime insect noise dominates in warmer seasons.

In areas with elevated background sound levels, sound may be obscured through a mechanism referred to as acoustic masking. Seasonal effects such as cricket chirping, certain farming activities, as well as wind-generated ambient noise as airflow interacts with foliage and cropland, contribute to this masking effect. The latter is most prevalent in rural and suburban areas with established tree stands. Wintertime defoliate conditions typically have lower background sound levels due to lower wind masking effects and reduced outdoor activities in colder climates. During colder seasons, people typically exhibit lower sensitivities to outdoor sound levels, particularly in this geographical region of the United States, as windows and doors are typically closed, and limited time is spent outdoors as compared to more temperate climates.

Some land uses are considered more sensitive to intrusive noise than others due to the type of activities typically involved at the receptor location. Sensitive noise receptors normally include residences, schools, libraries, religious institutions, hospitals and nursing homes, daycare centers, and some types of businesses; North Dakota also specifies community buildings as noise sensitive receptors. Noise sensitive receptors in the Project Area are identified on Figure 10.

At the state level, the North Dakota Administrative Code (NDAC) requires that the potential for adverse impacts at noise sensitive receptors be assessed during the site selection process. NDAC 69-06-08-01 Section 4 establishes avoidance areas for wind energy facilities, stating:

> A wind energy conversion facility site must not include a geographic area where, due to operation of the facility, the sound levels within one hundred feet of an inhabited residence or a community building will exceed fifty dBA. The sound level avoidance area criteria may be waived in writing by the owner of the occupied structure or the community building.

The North Dakota standard is the strictest noise limitation applicable to Project operation.

Morton County does not currently have noise standards or ordinances that are applicable to the Project. The Stark County Zoning Ordinance, section 6.7 mandates that, “Sustained noise over eighty (80) decibels (dB) during the day and seventy (70) decibels (dB) at night is prohibited.” It does not specify where these noise limits apply (e.g., at noise-sensitive receptors).

The recommended EPA noise guideline is an Ldn of 55 dBA (Ldn(24-hours), applicable to outdoor locations at noise sensitive receptors where extended periods of time are spent, (e.g., residential yards). This noise level corresponds to a maximum instantaneous equivalent sound level (Leq) of 48.6 dBA. The EPA guideline is essentially echoed by the North Dakota standard.

The National Safety Council (NSC) recommends no more than 85 dBA for 8 hours of exposure as the safe limit for farm operations. Industrial standards of the Occupational Safety and Health Administration (OSHA) regulations would apply to those involved in the construction, operation, and maintenance of the facilities. OSHA permissible noise exposures are shown in Table 13.

Table 13. OSHA Permissible Noise Standards

Duration (number of hours per day)	Sound Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.75	110
0.5	115

4.15.1 Existing Conditions

Stark and Morton counties would generally be characterized as a rural agricultural land use area, and existing ambient sound levels are expected to be relatively low, although sound levels may be sporadically elevated in localized areas due to roadway noise or periods of human activity. Principal contributors to the existing acoustic environment likely include motor vehicle traffic, farming equipment, farming activities such as plowing and irrigation, all-terrain vehicles, local roadways, rail movements, periodic aircraft flyovers, and natural sounds such as birds, insects, and leaf or vegetation rustle during elevated wind conditions in areas with established trees or crops. Typical baseline noise levels in the Project Area likely range from approximately 38 average day-night sound levels measured in A-weighted decibels (dBA) to 48 dBA (EPA 1978). Potential noise receptors in the vicinity of the Project Area are limited to scattered rural residences; there are no schools, libraries, places of worship, community buildings, places of business or other types of noise sensitive receptors within or within one mile of the Project Area (Figure 10). Twelve residences have been identified within or within one mile of the Project Area. Of those 12, 7 are occupied, 1 is not occupied, and 3 are undetermined. Figure 10 shows the location of all known occupied residences and residences of unknown occupancy; the one unoccupied residence is not shown on the map, and is not considered a potential noise-sensitive receptor.

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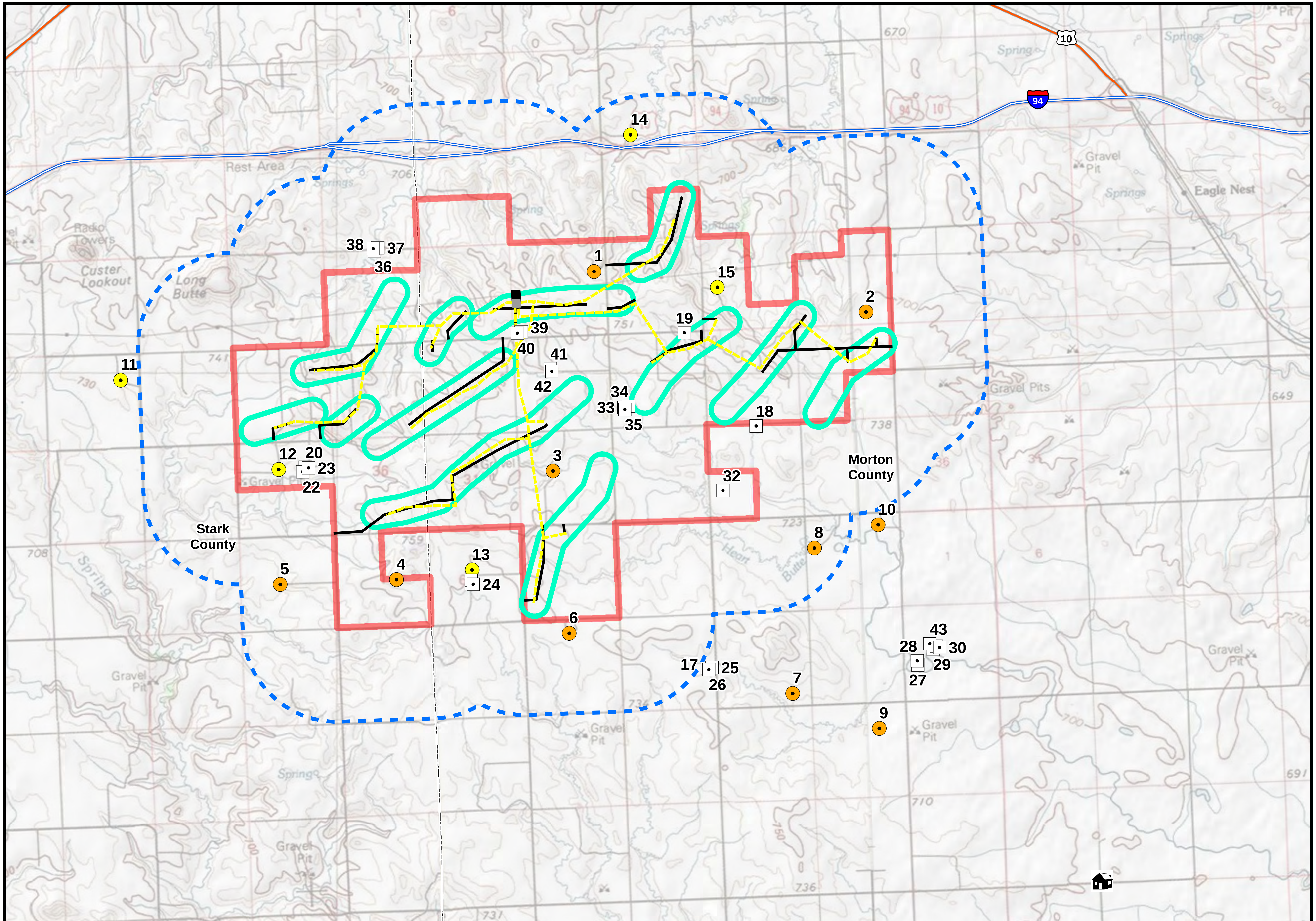
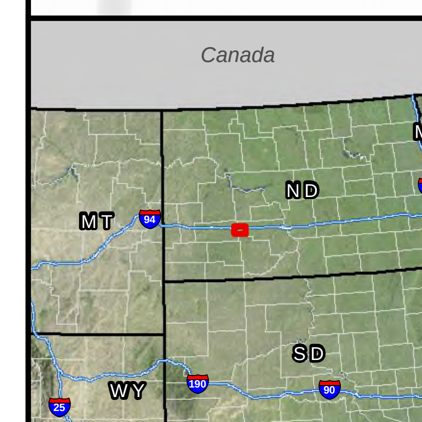


Sunflower Wind Project Environmental Assessment

Figure 10
Noise and Shadow Flicker Sensitive Receptors

Morton and Stark Counties, ND
April 2014

- Project Area
- Project Area 1-mile Buffer
- Preliminary Turbine Array Corridor
- Proposed Interconnection Switchyard
- Proposed Substation
- Approximate Underground Collection System Routing
- Approximate Access Road Routing
- Occupied Residence
- Structure (Occupation Unknown)
- Unoccupied Structure
- School
- County Boundary
- Interstate Highway
- Federal Highway



1:64,000 WGS84 UTM Zone 13N

0 2 4 Miles

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4.15.2 Potential Impacts

Noise from wind energy facilities includes primarily mechanical and aerodynamic noise from the wind turbines, and noise emanating from substation and interconnection equipment. Mechanical noise is primarily generated by the gearbox, generator, cooling fans and other moving parts within the wind turbine. Mechanical noise tends to be tonal but also has a broadband component. Aerodynamic noise originates primarily from the flow of air over and past the blades, so it generally relates to the ratio of blade tip speed to wind speed. Aerodynamic noise is characterized by a broadband “swish” sound, and is the dominant noise component for modern wind turbines. Some noise would also be generated from substation and interconnection equipment. The primary noise from substations is a tonal noise emanating from the transformers; this occurs at harmonic frequencies of the transmission frequency (e.g., 120, 240 and 360 Hz tones on a 60-Hz transmission system).

Significant impacts may occur if the Project results in noise levels in exceedance of national, state or local standards, without obtaining a waiver from the owner of the affected noise sensitive receptor.

Construction

The construction of the Project may cause short-term noise impacts. The sound levels resulting from construction activities vary significantly depending on factors such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. The only noise standard applicable to construction is the Stark County standard quoted above. Construction noise is highly unlikely to exceed the 80 dBA daytime limit in this standard given the distance to the nearest residences, and construction noise would not be considered “sustained” noise as specified in that standard. Nevertheless, all reasonable efforts will be made to minimize the impact of noise resulting from construction activities

Once the Project has been built, no noticeable noise impacts are anticipated from regular maintenance.

Operation

Noise generation data is provided by the manufacturer of each considered turbine type, and is a composite of both mechanical and aerodynamic noise based on empirical measurements. Noise measurements are typically taken at ground level, downwind of a turbine, at a distance equal to the hub height plus ½ rotor diameter.

Table 14 provides manufacturers’ noise ratings for each of the five turbines considered for the Project. This table indicates the typical distance at which turbine noise would exceed the North Dakota Noise Standard for Wind Energy of 50 dBA, as well as the typical distance at which turbine noise would fade to background levels. These are based on a single turbine using a simple geometric attenuation model, and may be somewhat different for a turbine array.

Table 14. Noise Characteristics for Considered Wind Turbine Models

	Vestas 2.0 V-110	Vestas 2.0 V-100	GE 1.7-100	GE 1.85-87	Siemens 2.3-108
Maximum Noise Level per Manufacturer (dBA)	107.5	105.0	107.0	106.5	108.0
Distance (feet) from one turbine to Achieve Compliance with ND Noise Standard for Wind Energy (50 dBA)	920	720	930	875	975
Distance (feet) from one turbine to Assumed Background Sound Level (38 dBA)	2,500	2,000	2,600	2,425	2,675

Table 14 indicates that turbines would need to be set back from 720 to 975 feet from noise sensitive receptors in order to avoid exceedances of the state noise standard. At a distance of 2,000 to 2,675 feet from a wind turbine (depending on model), the turbine noise would be indistinguishable from background noise levels.

As the final layout of the Project is designed, Sunflower will observe the setbacks to residences as established by Morton and Stark Counties (see Section 4.12). Wind turbines will be sited a minimum of 1,320 feet from occupied residences in Morton County and 2,000 feet from occupied residences in Stark County, in accordance with the requirements of the respective county zoning regulations.

Table 15 indicates typical noise levels from each of the considered turbine types at the respective Morton and Stark county setback limits. Because noise is additive when there is an array of turbines, Table 16 indicates noise levels where one, two or three turbines would be placed at the setback lines. The noise levels for the three-turbine array are very conservative, as it is highly unlikely that three turbines could be placed within this proximity of a single noise sensitive receptor.

Table 15. Predicted Noise Levels at County Setback Limits

Specification		Vestas 2.0 V-110	Vestas 2.0 V-100	GE 1.7-100	GE 1.85-87	Siemens 2.3-108
Highest Spec. Noise (dBA L_{eq}) at 1320 feet (Morton County Setback Limit)	1 WTG	45	43	46	45	47
	2 WTGs	48	46	49	48	50
	3 WTGs	50	47	50	49	51
Maximum Noise (dBA L_{eq}) at 2000 feet (Stark County Setback Limit)	1 WTG	40	38	41	40	42
	2 WTGs	43	41	44	43	45
	3 WTGs	45	43	46	45	46

This analysis demonstrates that the implementation of standard county setbacks would likely avoid all potential noise exceedances for any of the five turbine models considered. A complete noise analysis will be conducted as part of the final Project layout. If a potential exceedance cannot be avoided through micrositing and application of standard county setbacks, Sunflower will request waivers from the affected landowners or further adjust the Project layout to avoid a potential noise exceedance.

Potential Noise Impacts to Wildlife

Although it is likely that construction of the Project will result in short-term disturbance of wildlife, it will be difficult to assess whether the disturbance comes from the noise of construction activities or the activities themselves (e.g., construction vehicles moving along roads). All such activities will be short-term and limited to the period of construction. Available research regarding the noise impacts of wind farm operations suggests that animals in the area would either habituate to consistent low-frequency noise from the turbines or would alter their behaviors to adapt to the new acoustic environment (e.g., Rabin et al. 2003, Brumm and Slabbekoorn 2005, Wood and Yezerinac 2006)

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would not create additional noise impacts. Noise disturbance would be limited to the use of equipment to remove the existing conductors and install new wires. This would be short-term and temporary. Once the new conductors are in place, the Mandan-Ward and Ward-Bismarck transmission lines are likely to operate with a lower noise level than currently exists as the new conductors would likely exhibit less corona activity than the older wires that are likely to be dirtier and more pitted.

Indirect Impacts

The Project would have no indirect noise impacts.

Avoidance, Minimization and Best Management Practices

Sunflower will work to site turbines in the final design stage such that potential noise exceedances would be avoided if possible, and would work with landowners and/or residents to obtain waivers where avoidance is not practical.

Sunflower will implement conservation measures applicable to noise, as identified in the Draft UGP Wind Energy PEIS (see PEIS section 5.5.2), as follows:

Measures applicable throughout multiple phases of a wind energy development project include the following:

- Take advantage of topography and the distance to nearby sensitive receptors when positioning potential sources of noise.
- Establish sufficient setback distances from sensitive receptors wherever feasible. Based on previous experience, noise complaints seldom exist for people living more than 1–1.5 mi (1.6–2.4 km) from a wind farm (Stewart 2006).
- Select equipment with the lowest noise levels available and no prominent discrete tones, when possible.

- Maintain all equipment in good working order in accordance with manufacturer specifications. Suitable mufflers and/or air-inlet silencers should be installed on all internal combustion engines and certain compressor components.
- All vehicles traveling within and around the project area should operate in accordance with posted speed limits.
- Establish a process for documenting, investigating, evaluating, and resolving project-related noise complaints.

Measures applicable during construction of a wind energy project include the following:

- Limit noisy construction activities to the least noise-sensitive times of day (daytime only, between 7 a.m. and 7 p.m.) and weekdays.
- Schedule noisy activities to occur at the same time whenever feasible, since additional sources of noise generally do not greatly increase noise levels at the site boundary. Less-frequent but noisy activities would generally be less annoying than lower-level noises occurring more frequently.
- Locate stationary construction equipment (e.g., compressors or generators) as far as practical from nearby sensitive receptors.
- In the unlikely event that blasting or pile driving would be needed during the construction period, notify nearby residents in advance.

Measures applicable during operation of a wind energy project include:

- If a transformer becomes a noise issue, a new transformer with reduced flux density generating noise levels as much as 10–20 dB lower than National Electrical Manufacturers Association (NEMA) standard values could be installed. Alternatively, barrier walls, partial enclosures, or full enclosures could be adopted to shield or contain the transformer noise, depending on the degree of noise control needed.

The same measures applicable to construction activities are applicable to decommissioning activities.

Additional site-specific measures to reduce noise impacts may be identified and implemented, however noise impacts are not anticipated to be significant for any of the turbine models considered.

4.16 Transportation

4.16.1 Existing Conditions

Ground Transportation

The analysis area for transportation impacts is the area delineated by roadways adjacent to the Project Area. The Project Area is generally bounded by I-94 on the north side, 43rd Street on the south, 80th Avenue on the west, and 73rd Avenue on the east. Local county roads are spaced throughout the Project Area; these are generally section line roads. However, while section lines in North Dakota are all designated as public right-of-way, not all section line rights-of-way have been developed as roads, or are owned or maintained by the local counties. County-maintained roads within the Project Area are shown on Figure 3.

State Highway 10 (ND 10)[5] is the only other major road in the vicinity; it runs through Hebron en route between Glen Ullin and Richardton. A Burlington Northern Santa Fe (BNSF) rail line runs roughly adjacent to ND 10.

Most construction equipment and materials would arrive at the Project Area via truck, along I-94. An existing interchange is located south of Hebron at 76th Avenue, approximately at the center of the north side of the Project Area; this interchange and 76th Avenue would serve as the primary route from the highway into the Project Area. Additional I-94 interchanges are located one mile northeast (at ND 10) and three miles west (at 83rd Avenue) of the Project Area, allowing options for specific routing of Project materials if necessary.

According to the North Dakota Department of Transportation (NDDOT)'s 2007 Functional Classification Maps, all roads within the Project Area are considered local roads. 76th Avenue north of I-94 is a County Major Collector, as are ND 10 and 44th Street SW, which runs east-west one mile south of the Project Area between Glen Ullin and 83rd Avenue (this route is also named as County Road 138, and on the NDDOT maps as CMC 3018 in Morton County and CMC 4520 in Stark County). The Morton County Road Map identifies 76th Avenue south of Hebron and County Road 89 as County Highways. In the Morton County Comprehensive Plan, ND 10 and 76th Avenue north of I-94 are identified as Major Collectors, while other roads in the vicinity are minor county roads. Some are shown on the Morton County Road Map as minimum maintenance roads. The Stark County Comprehensive Plan does not provide road classifications; all roads in the Project Area appear to be minor county or private roads. Roads within the Project Area are generally gravel surfaced.

Traffic volume data in the vicinity of the Project are limited. No vehicle count data are available for the county and township roadways in the Project Area. Traffic counts are available for some roads in the vicinity. Available existing traffic volumes on the area's roadways are documented in Table 16.

[5] The status of ND 10 as a state highway, and its correct name, are unclear. On some maps it is identified as a state highway, while on others, including maps from the NDDOT, it is referred to as a county road. Some maps name it as County Road 139; the Morton County Road Map names it as County Highway 139; and the NDDOT 2007 Functional Classification Map names it as County Maintained Collector 3006. For ease of reference in this document, it is referred to as ND 10.

Table 16. Existing Daily Traffic Levels

Roadway Segment	Existing Average Annual Daily Traffic (AADT)/Commercial Truck Traffic
I-94 at Richardton	7320/ 2110
I-94 at Hebron	7595/ 2145
I-94 westbound exit at Hebron	70/ n/a
!-94 westbound on-ramp at Hebron	250/ n/a
I-94 eastbound exit at Hebron	85/ 20
I-94 eastbound on-ramp at Hebron	75/ 25
76th Ave north of I-94	500/ n/a
76th Ave south of I-94	140/ n/a
ND10 at Glen Ullin	575/ 55
ND 10 west of Hebron	190/ 15
83rd Avenue south of I-94	225/ n/a
ND 8 south of Richardton	555/ n/a
50th Street SW at ND 8	25/ n/a

Source: North Dakota DOT Transportation Information Map (NDDOT, 2013).

Additional county and township roads run through the Project Area in addition to those listed in Table 16, but no vehicle count data are available for them. In general, the North Dakota Department of Transportation (NDDOT) indicated that roads with vehicle counts under 100 AADT are rarely counted. According to NDDOT, vehicle counts on routes with no count data are likely lower than those with count data. For purposes of comparison, the functional capacity of a two-lane paved rural road is approximately 5,000 vehicles per day, or Average Annual Daily Traffic (AADT). Paved four-lane highways such as I-94 have a functional capacity of approximately 80,000 vehicles per day. Based on these data, traffic volumes on the roads in and near the Project Area are low and levels of service are high.

Air Transportation

There are two public airports and four private airports within 25 miles of the Project Area (Table 17). Setbacks from public and private airports follow North Dakota Aeronautics Commission and FAA requirements.

Table 17. Public/Private Airports within 25 Miles of the Project Area

Airport Name	Type	Distance from the Project Area (miles)
Chase Airstrip	Private	4.4
Glen Ullin Regional	Public	5.75
Richardton	Public	10.7
Brands	Private	15.0
Fitterer's Strip	Private	16.5
Jurgens Airstrip	Private	17.4

Notice to the FAA allows the agency to evaluate the effect of the proposed construction on air safety and navigable airspace, which begins with a determination of whether the proposed structure represents an obstruction. Thresholds for notice are defined in 14 CFR Subpart B Section 77.9, and are related to construction that would represent an obstruction or would intrude upon protected airspace or approach and takeoff clearance areas around airports. The first threshold for notice is any construction or alteration that would exceed 200 feet above ground level. The second threshold for notice is construction that would exceed the height of an imaginary surface extending upward and outward for a horizontal distance of 20,000 feet (3.8 miles) from a public use airport, a military airport, an airport operated by a federal agency or the Department of Defense, or an airport with an FAA-approved Instrument Approach Procedure (IAP).

The Project meets the first threshold for notice to the FAA and a determination of hazard. The Project is required to submit notice to the FAA due to the overall height of the considered wind turbine models. Although there is one private airstrip, Chase, within 3.8 miles of the Project Area, this airfield is not public, is not operated by the military or other federal agency, and does not have an FAA-approved IAP, so the notification requirement is not triggered by the presence of this airstrip.

Obstructions are defined in 14 CFR 77, Subpart C (Sections 77.13 through 77.23), which defines obstructions based on both absolute height of the proposed object and height in relation to protected airspace, in effect establishing five distinct thresholds. The first threshold is defined in Section 77.17(a)(1) as an object that is greater than a height of 499 feet above ground level at the site of the object. The second threshold is defined in Section 77.17(a)(2) as an object with "a height that is 200 feet AGL, or above the established airport elevation, whichever is higher, within 3 nautical miles [3.45 statute miles] of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length." As with the notification requirement, "airport" is defined as a public use airport, a military airport, an airport operated by a federal agency or the Department of Defense, or an airport with an FAA-approved Instrument Approach Procedure (IAP). A Determination of No Hazard to Air Navigation will be issued when the aeronautical study concludes that the proposed construction or alteration will exceed an obstruction standard but would not have a substantial aeronautical impact to air navigation. A Determination of No Hazard may include conditional provisions, limitations to minimize potential problems, supplemental notice requirements, or requirements for marking and lighting, as appropriate.

4.16.2 Potential Impacts

Direct Impacts

Ground Transportation

Construction of the Proposed Action would increase traffic on local roads to the Project Area, possibly causing temporary impacts to local traffic flow while equipment is hauled to the site. Construction-related vehicles would primarily use I-94, and access the Project Area via the interchange with 76th Avenue just south of Hebron. The Project EPC contractor would obtain any necessary permits for transporting equipment.

While the number of vehicle trips for workers and equipment has not been modeled, construction traffic is highly unlikely to materially impact local traffic patterns or lower the existing levels of service, given the low volume of existing traffic.

Impacts to existing road infrastructure will mostly be positive. Construction activities associated with the Proposed Action would use the existing local roads whenever possible. Where needed, existing local roads will be improved to allow heavy construction cranes and extra-long trucks used to transport turbine blades. These on-site and offsite improvements will remain in place following the completion of construction to assist with access and maintenance of the proposed facilities. Roads damaged during construction will be returned to pre-construction condition or better.

Air Traffic

The installation of wind turbines creates a potential for impacts to air traffic. However, no new transmission lines will be constructed as part of the Project, and the wind turbines and meteorological towers themselves will be visible from a distance. The wind turbines and meteorological towers will have lighting and markings that comply with FAA requirements. Due to minimal air traffic, generally good visibility, and lighting, etc., no impact to air traffic is anticipated.

Because the Project is not located in close proximity to any airport, construction of the Project is expected to result in a Determination of No Hazard to Air Navigation, with the condition that the Project include lighting on selected turbines and utilize white- or off-white-colored turbines and towers to enhance visibility of the Project to pilots. The Project would not affect protected airspace for any airport as defined in the FAA rules.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no impact to air traffic. This work would utilize the existing transmission support towers and all work would occur within the existing transmission right-of-way. The reconductored transmission lines would be essentially identical to their current configuration.

Indirect Impacts

The Project would not create indirect impacts to transportation.

Avoidance, Minimization and Best Management Practices

Sunflower will observe the setbacks to roadways as established by the State in NDAC 69-06-08 during final micrositing of Project infrastructure. The observance of these setbacks would prevent damage to area roadways or disruptions to local travel in the unlikely event of a catastrophic failure of a wind turbine.

Sunflower will also comply with avoidance and minimization measures and BMPs related to transportation impacts as identified in the Draft UGP Wind Energy PEIS, as follows:

- Existing roads should be used to the extent possible, but only in safe and environmentally sound locations. If new access roads are necessary, they should be designed and constructed to the appropriate standard necessary to accommodate their intended function (e.g., traffic volume and weight of vehicles) and minimize erosion. Access roads that are no longer needed should be recontoured and revegetated.
- A transportation plan should be prepared that identifies measures the developer will implement to comply with State or Federal requirements and to obtain the necessary permits. This will typically address the transport of turbine components, main assembly crane, and other large pieces of equipment. The plan should consider specific object size, weight, origin, destination, and unique handling requirements and should evaluate alternative means of transportation (e.g., rail or barge).
- A traffic management plan should be prepared for the site access roads to ensure that no hazards would result from increased truck traffic and that traffic flow would not be adversely impacted. This plan should identify measures that will be implemented to comply with any State or Federal DOT requirements, such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configurations. Signs should be placed along roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local communities, consideration should be given to limiting construction vehicles on public roadways during the morning and late afternoon commute times.
- Project personnel and contractors should be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions to ensure safe and efficient traffic flow.
- During construction, operations and maintenance, and decommissioning phases, traffic should be restricted to designated project roads. Use of other unimproved roads should be restricted to emergency situations.

Additional site-specific measures to further reduce impacts to transportation systems may be identified and implemented as appropriate; however impacts to transportation are not anticipated to be significant.

4.17 Human Health and Safety

4.17.1 Existing Conditions

Telecommunication and Radar

Wind turbines can cause loss of detection, false alarms, and corrupt data for primary and weather surveillance radar. This is a concern for air traffic control, the Department of Defense (DOD), Department of Homeland Security (DHS), Federal Aviation Administration (FAA), and for weather radar (i.e., NEXRAD [next generation weather radar]). The potential impacts to radar systems are greatest if wind turbines are placed within 10 nautical miles of a radar unit.

Telecommunications can be impacted by wind turbines if the turbines are placed within the line-of-sight between two communicating towers. Two private land-mobile communication towers and one microwave transmission tower are located within the Project Area (HDR 2011; see Appendix D). Seventeen registered microwave towers are located on a large hill (Custer Lookout) about 1.5 miles west of the Project Area.

A microwave beam path study was conducted to identify all non-federal microwave telecommunication systems, as well as AM, FM, cellular, and television tower locations (see report in Appendix D). The study identified 15 specific microwave pathways that cross the Project Area; the worst-case Fresnel zones (WCFZ) for each beam path were calculated. Turbines placed within these beam pathways would potentially cause disruptions to microwave communications.

The FAA's online Department of Defense (DoD) Preliminary Screening Tool (DoD Tool) allows developers to gain preliminary insights regarding potential impacts that structures may have on long range radars, military training routes, and special use airspace prior to official filing of an Obstruction Evaluation/Airport Airspace Analysis request with the FAA. This tool does not replace any official processes or procedures that may be required by the FAA.

The Long Range Radar Screening Tool indicates that there would be no impacts to Air Defense and Homeland Security radars, minimal to no impact to Weather Surveillance Radar or Doppler Radar, and no impacts to military airspace. When the notice of proposed construction to the FAA is filed (see Section 4.16), the FAA will conduct an aeronautical study that will include an assessment of potential impacts to radar systems.

Electromagnetic Fields

The term electromagnetic fields (EMF) refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from voltage, or electrical charges, and magnetic fields arise from current, or the flow of electricity through transmission lines, power collection lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line, and the intensity of the magnetic field is related to the current flow through the conductors.

The Project would generate EMF at the substation and interconnection switchyard and the underground collection system. All Project facilities would be set back from residences as required by state and county regulation. At these distances Project EMF levels would not be above background levels at the residences. The only exposure would be to maintenance workers, primarily at the substation.

Hazardous Materials / Hazardous Waste

The Project Area is located in a relatively rural area of North Dakota. Potential hazards may exist in rural areas from old gasoline facilities, landfill sites, and private activities. Hazardous wastes from large industrial or commercial activities are not likely.

The Environmental Protection Agency (EPA) Superfund National Priorities List (NPL) database was reviewed to determine the potential for major hazardous material issues within the Project Area. No NPL sites are present within Stark and Morton counties (U.S. EPA CERCLIS 2009;

cited in HDR 2011, see Appendix D). NDDOT maps were also consulted as they often identify known dumps in the area; there are no known dumps in the Project Area. There are no hazardous waste handlers or toxic release inventory sites located within the Project Area or within 5 miles of the Project Area (National Atlas 2009; cited in HDR 2011, see Appendix D).

Potentially hazardous materials associated with the Project include gear box oil, hydraulic fluid, and gear grease for the turbines, and mineral oil used for the transformers.

Vandalism, Sabotage, and Terrorism

Wind farms and associated infrastructure may be the subject of intentional destructive acts ranging from vandalism and theft to sabotage and acts of terrorism intended to disable a project. The most likely risk of damage to the Project would be from casual vandalism and targeted metal theft. Vandalism could take many forms, and would be very difficult to entirely prevent as these acts are often spontaneous and opportunistic in nature rather than premeditated acts. Examples would include damage to tower doors due to attempts to gain access, or damage to Project components from shooting or vehicles. Metal theft is an increasing problem for utilities, as the industry uses large amounts of copper and aluminum. Theft is most likely to involve substation and switchyard equipment that contains salvageable metal (e.g., copper and aluminum) when metal prices are high. Theft of these metals can be extremely hazardous to the thieves because of electrocution risk.

The Project would not constitute an attractive target for sabotage or terrorism, as the facilities would be difficult to damage, and the impact from any successful act would be negligible, both from a practical and political perspective. Western believes, therefore, that the proposed Project would present an unlikely target for an act of terrorism, and would have an extremely low probability of attack.

4.17.2 Potential Impacts

For the purpose of this analysis, a significant impact to public safety and health would occur if: 1) the Project resulted in an increase in personal injuries; 2) the Project resulted in an increase in health risk to area residents; 3) the Project resulted in impacts to public health as a result of increased electric and magnetic fields; or 4) the Project resulted in a violation of federal, state, or local regulations regarding handling, transport, or containment of hazardous materials.

All facilities would be constructed in accordance with the National Electrical Safety Code, U.S. Department of Labor Occupational Safety and Health Standards, and Central's Power System Safety Manual for maximum safety and property protection.

Telecommunications and Radar

A beam path study was conducted to identify all non-federal microwave telecommunication systems, as well as AM, FM, cellular, and television tower locations (see report in Appendix D). The worst-case Fresnel zones (WCFZ) for each beam path were calculated. The study identified several beam paths crossing the Project Area. These areas will be avoided during micrositing of the Project.

With the switch to digital television in 2009 throughout the United States, the concern of ghost images and flickering that may be caused by wind turbine interference with analog signals are no longer an issue.

The Long Range Radar Screening Tool indicates that there would be no impacts to Air Defense and Homeland Security radars, minimal to no impact to Weather Surveillance Radar or Doppler Radar, and no impacts to military airspace.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no adverse impact to telecommunications and radar; the improved lines would be essentially identical to the current configurations.

Electromagnetic Fields

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be the subject of research and debate. As discussed above, EMF levels would not be above background levels at any residences. The only exposure would be to maintenance workers, primarily at the substation, and no impacts to health and safety would be created.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would not cause adverse EMF impacts. This work would not increase EMF levels above existing levels, and may lower EMF levels depending on the specific conductor design and configuration.

Hazardous Materials / Hazardous Waste

The presence of hazardous materials within the Project Area is unlikely; however, Sunflower will conduct a Phase 1 Environmental Assessment prior to final design to further investigate historic uses of the site and the potential for contamination.

All hazardous materials will be handled in accordance with state and federal regulation. The potential for spills of hazardous materials will be mitigated by the implementation of a Spill Prevention, Control and Countermeasures (SPCC) Plan during construction of the Project. An SPCC Plan would not be necessary during the operational phase of the Project, because the only significant quantities of hazardous materials would be contained within the substation transformers, switches and circuit breakers. These are considered qualified oil-filled operational equipment, and require the establishment of an inspection and monitoring program, as well as a spill contingency plan and the commitment of resources to expeditiously control and remove any discharged oil. Sunflower will implement avoidance and minimization measures and best management practices identified in the Draft UGP Wind Energy PEIS as listed below to prevent potential releases of hazardous materials, and to quickly respond to spills if they occur. These measures will reduce the level of risk for human health impacts to a level of non-significance.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would not result in an increased hazard due to hazardous materials. The only hazardous materials that would be involved would be fuels and hydraulic oils for construction equipment. These would be managed according to the Project SPCC and in accordance with applicable state and federal regulations.

Vandalism, Sabotage, and Terrorism

Standard security measures will be taken during construction and operation, to limit access and deter many potential intruders. Such measures include temporary and permanent fencing at the substation and interconnection switchyard, posting of “High Voltage” warning signs and locks on equipment and wind power facilities. Access will be strictly controlled to all facilities, including turbines, the substation and the interconnection switchyard. Turbines will sit on solid-steel-enclosed tubular towers in which all electrical equipment would be located except for the pad-mounted transformer. Access to the turbines will only be through a solid steel door that will be locked when not in use. Access to the substation and switchyard will also be controlled by key entry. The presence of high voltage would also discourage theft and vandalism.

Landowner and maintenance worker monitoring will also serve to deter acts of theft or vandalism. Resident landowners would be expected to be vigilant concerning unauthorized persons on their property, and the presence of Project personnel on site would add additional observers. The relatively remote location of the Proposed Project would tend to reduce vandalism on the whole, because of the small number of people who would be expected to encounter the turbines or transmission line. However, this same remoteness might encourage a rare act of opportunistic vandalism. Such occurrences would be infrequent and would be vigorously investigated and prosecuted to discourage further acts. Vigorous prosecution of thieves and monitoring of metal recycling operations might deter the theft of equipment. Similarly, the prosecution of vandals who have damaged or destroyed project equipment might discourage vandalism.

The effects of intentional destructive acts could be wide ranging or more localized, depending on the nature and location of the acts and the size of the project, and would be similar to outages caused by natural phenomena such as storms and ice buildup. Since the wind project taps the Western system, destructive acts to the wind project would not have a local or regional effect since auxiliary power would come from other sources than the wind turbines.

Destructive acts could cause environmental effects from damage to the facilities. Two such possible effects would be fire ignition, should conductors be brought down, and oil spills from equipment (e.g., mineral oil in transformers) in the substation, should that equipment be damaged or breached. Fires would be fought in the same manner as those caused by an electrical storm. Any spills would be treated by removing and properly disposing of contaminated soil and replacing it with clean soil. Implementation of the Western Standard Construction Practices and applicable avoidance and minimization measures from the UGP Wind Energy PEIS would be applied to inhibit intentional destructive acts.

These measures will act to reduce the potential for vandalism, sabotage and terrorism-related impacts. Western believes that the Project presents an unlikely target for an act of terrorism, with an extremely low probability of attack. Similarly, the reconductored Mandan-Ward and Ward-Bismarck transmission lines also represent an unlikely target for an act of terrorism, and the reconductoring work would not significantly alter the lines’ design or purpose such that they would become a more likely target or would be more vulnerable to an attack.

Avoidance, Minimization and Best Management Practices

Sunflower will comply with the avoidance and minimization measures and BMPs identified in the Draft UGP Wind Energy PEIS related to human health and safety, interference with communications and radar systems, hazardous materials management, EMF and sabotage (see PEIS sections 5.12.1.4 and 5.13.4), as follows:

Measures to protect wind energy facility and transmission line workers are applicable during all phases associated with a project.

- All site characterization, construction, operation, and decommissioning activities must be conducted in compliance with applicable Federal and State occupational safety and health standards (e.g., the Occupational Health and Safety Administrations [OSHA's] Occupational Health and Safety Standards, 29 CFR Parts 1910 and 1926, respectively).
- Conduct a safety assessment to describe potential safety issues and the means that would be taken to mitigate them, covering issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.
- Develop a health and safety program to protect workers during site characterization, construction, operation, and decommissioning of a wind energy project. The program should identify all applicable Federal and State occupational safety standards and establish safe work practices addressing all hazards, including requirements for developing the following plans: general injury prevention; personal protective equipment (PPE) requirements and training; respiratory protection; hearing conservation; electrical safety; hazardous materials safety and communication; housekeeping and material handling; confined space entry; hand and portable power tool use; gas-filled equipment use; and rescue response and emergency medical support, including on-site first-aid capability.
- As needed, the health and safety program must address OSHA standard practices for the safe use of explosives and blasting agents (if needed for site development); measures for reducing occupational EMF exposures; the establishment of fire safety evacuation procedures; and required safety performance standards (e.g., electrical system standards and lighting protection standards). The program should include training requirements for applicable tasks for workers and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies should be established.
- Design all electrical systems to meet all applicable safety standards (e.g., the National Electrical Safety Code) and comply with the interconnection requirements of the transmission system operator.
- In the event of an accidental release of hazardous substances to the environment, document the event, including a root cause analysis, a description of appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event should be provided to permitting agencies and other appropriate Federal and State agencies within 30 days, as required.

The following measures for the protection of public health and safety are applicable during all phases associated with a wind energy project:

- Develop a project health and safety program that addresses protection of public health and safety during site characterization, construction, operation, maintenance, and decommissioning activities for a wind energy project. The program should establish a safety zone or setback for wind energy facilities and associated transmission lines from residences and occupied buildings, roads, ROWs, and other public access areas that is sufficient to prevent accidents resulting from various hazards during all phases of development. It should identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It should also identify measures to be taken during the operations phase to limit public access to facilities (e.g., equipment with access doors should be locked to limit public access, and permanent fencing with slats should be installed around electrical substations).
- Develop a traffic management plan for the site access roads to control hazards that could result from increased truck traffic (most likely during construction or decommissioning), ensuring that traffic flow would not be adversely affected and that specific issues of concern (e.g., the locations of school bus routes and stops) are identified and addressed. This plan should incorporate measures such as informational signs, flaggers (when equipment may result in blocked throughways), and traffic cones to identify any necessary changes in temporary lane configurations. The plan should be developed in coordination with local planning authorities.
- Site and design wind energy facilities to eliminate glint and glare effects on roadway users, nearby residences, commercial areas, or other highly sensitive viewing locations, or reduce it to the lowest achievable levels.
- Use proper signage and/or engineered barriers (e.g., fencing) to limit access to electrically energized equipment and conductors in order to prevent access to electrical hazards by unauthorized individuals or wildlife.
- If operation of the wind energy facility and associated transmission lines and substations could cause potential adverse impacts on nearby residences and occupied buildings as a result of noise, sun reflection, or EMF, incorporate recommendations for addressing these concerns into the project design (e.g., establishing a sufficient setback from transmission lines).
- Site and design the project to comply with FAA regulations, including lighting requirements, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.
- Develop a fire management and protection plan to implement measures to minimize the potential for a human-caused fire and to respond to human- caused or natural-caused fires.
- Project developers shall work with appropriate agencies (e.g., DOE and TSA) to address critical infrastructure and key resource vulnerabilities at wind energy facilities, and to minimize and plan for potential risks from natural events, sabotage, and terrorism.

Sunflower will implement these measures while finalizing the Project layout, and during construction, operation, and decommissioning of the Project. Additional site-specific measures may be identified and implemented as appropriate; however, the Project is not expected to have a significant adverse effect on human health and safety.

4.18 Recreation

4.18.1 Existing Conditions

There are no designated recreation areas, public or private parks and no designated trails in or near the Project Area. The nearest known public recreational resource is the BLM Schnell Recreation Area, located approximately 9 miles northwest of the Project Area.

A major recreational activity in North Dakota is hunting. The NDFGD runs the Private Land Open to Sportsmen (PLOTS) program, under which private lands enrolled in the program may be opened to the public for hunting. No PLOTS are located within the Project Area; several PLOTS parcels are located near the southwestern corner of the Project Area (see Figure 2). These PLOTS lands would not be impacted by the Project.

4.18.2 Potential Impacts

Because there are no designated recreation resources in and near the Project Area, the Project would have no impact to recreation. No conservation measures are proposed.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no significant adverse impacts to recreation resources. The work would occur entirely within the existing rights-of-way and would utilize existing access roads and other existing infrastructure. If any portion of the right-of-way is used for recreation, access to that area would be temporarily disrupted during construction, but would be allowed to resume once reconductoring is completed.

4.19 Cultural, Historical, and Architectural Resources

Cultural resources include archeological sites, historic standing structures, objects, districts, traditional cultural properties and other properties that illustrate important aspects of prehistory or history or have important and long-standing cultural associations with established communities or social groups. Significant archeological and architectural properties are usually defined by eligibility criteria for listing in the National Register of Historic Places (NRHP), in consultation with the State Historic Preservation Office (SHPO).

4.19.1 Existing Conditions

A search of the State Historical Society of North Dakota's web site and manuscript files was conducted for the Area of Potential Effect (APE), defined as the area in and within 1 mile of the Project Area. The file search revealed one site, no site leads, and no isolated finds within a one mile radius of the APE; and four manuscripts on file within sections of the APE (see Tables 2 and 3 in Appendix C). A portion of previously recorded site 32MO1379 was located within the APE.

A Class III pedestrian survey was conducted in September 2013 by Beaver Creek Archaeology, Inc. (BCA; see report in Appendix D). During the field inventory, BCA archaeologists identified four previously unrecorded cultural resources and one previously recorded site. Resources included one Native American cultural material scatter (32MO1379), two Native American Isolated Finds (32MOx553 and 32MOx554), and two Historic/Architectural Sites (32MO1415 and 32MO1416). The Native American cultural material scatter site has been recommended unevaluated to the National Register of Historic Places (NRHP) by BCA, and is recommended to be avoided during construction. The two Isolated Finds and Historic/Architectural sites were recommended as not eligible to the NRHP and will not need to be avoided. Further evaluation of the Native American cultural material scatter site in consultation with SHPO may find that this site is not eligible for NRHP listing and does not need to be avoided; however, avoidance will be assumed until such time as SHPO makes such a determination.

BCA also conducted an architectural inventory of structures and buildings around the Project Area to determine the potential for visual impacts to potentially NRHP-eligible architectural sites caused by the Project. During the visual impact inventory, seven architectural locations, with 16 structures, were examined. None of the structures in the APE were recorded as potentially eligible for NRHP listing. The BCA report notes that the survey did not cover all potential impacts of the Project, since the location of some facilities was not known at the time of the surveys. Sunflower will conduct additional surveys prior to construction to characterize any potential new impact areas.

The online NRHP database was searched for registered properties in the APE. No NRHP registered archaeological or historic facility resources are located within the APE.

The absence of listed archaeological and/or historic facility resources does not mean the Project Area is clear of significant resources. It is possible there are both recorded and unrecorded resources in the Project Area that may be significant, but which have been neither evaluated nor had their status determined. Additionally, previously unknown cultural or archaeological resources may be identified during Project construction.

4.19.2 Potential Impacts

A significant impact to cultural resources would occur if a site or archaeological, tribal, or historical value that is listed, or is eligible for listing, in the NRHP could not be avoided or mitigated during siting or construction of the Proposed Action.

Possible concerns that should be considered for this project include:

- Unrecorded cultural resources located within the study area;
- Any ground disturbing activity within the study area that has potential to impact known or unknown cultural resources; and
- Visual impacts to recorded or unrecorded cultural resource properties.

No significant impacts to cultural resources are anticipated from the Proposed Action. As the layout of the Project is finalized, the location of Project facilities will be adjusted as needed to avoid impacts to cultural resources.

If historic or prehistoric materials are discovered during monitoring of earth-disturbance construction activities, construction would be halted and Western would be notified in order to initiate procedures outlined in 36 CFR Part 800. These procedures would include evaluating the find for eligibility and determining appropriate treatment with the SHPO and the North Dakota Intertribal Reinterment Committee (NDIRC).

An impact to significant architectural resources would occur if a site that is listed, or is eligible for listing, in the NRHP would be affected by the Project. Effects can be either direct, which involves physical harm to a listed or eligible resource, or indirect, which involves a change in the setting, feeling or associations related to a listed or eligible resource. Since no NRHP listed or eligible architectural resources are known to exist in the Project Area, impacts are not expected.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would not impact cultural, historical or archaeological resources. That work would utilize existing access roads and other disturbed areas, and would not require the disturbance of additional lands. Reconductoring would not substantially alter the appearance of the existing transmission line, so would not impact the viewshed of listed properties or sites.

Avoidance, Minimization and Best Management Practices

In addition to the measures noted above, Sunflower will implement avoidance and minimization measures and best management practices applicable to historic and cultural resources identified in the Draft UGP Wind Energy PEIS (see PEIS sections 5.8.1.6 and 5.9.1.6), as follows:

The following conservation measures could be implemented to address potential impacts on potential paleontological resources:

- Whether paleontological resources exist in a project area should be determined on the basis of the sedimentary context and soil surveys of the area, a records search of Federal, State, and local inventories for past paleontological finds in the area, review of past paleontological surveys, and/or a paleontological survey.
- Placement of wind energy structures in fossil-rich areas, such as outcrops, should be avoided.
- A paleontological resources management plan should be developed for areas where there is a high potential for paleontological material to be present. Management options may include avoidance, removal of the fossils, or monitoring. If the fossils are to be removed, a mitigation plan should be drafted identifying the strategy for collection of the fossils in the project area. Often it is unrealistic to remove all of the fossils, in which case a sampling strategy can be developed. If an area exhibits a high potential, but no fossils were observed during surveying, monitoring could be required. A qualified paleontologist should monitor all excavation and earthmoving in the sensitive area. Whether the

strategy chosen is excavation or monitoring, a report detailing the results of the efforts should be produced.
- If an area has a strong potential for containing fossil remains and those remains are exposed on the surface for potential collection, steps should be taken to educate workers and the public on the consequences of unauthorized collection.

The following conservation measures could be implemented to address potential impacts on cultural resources:

- The appropriate Federal agency should consult with federally recognized Native American governments early in the planning process for a wind energy development to identify issues and areas of concern. Consultation is required under the NHPA. Consultation is necessary to establish whether the project is likely to disturb traditional cultural properties, affect access rights to particular locations, disrupt traditional cultural practices, and/or visually impact areas important to the tribe(s).
- The presence of archaeological sites and historic properties in the area of potential effect should be determined on the basis of a records search of recorded sites and properties in the area and/or an archaeological survey. The SHPO is the primary repository for cultural resource information. The National Register of Historic Places could also be consulted at http://www.nps.gov/nr/research/index.htm.
- Archaeological sites and historic properties present in locations that would be affected by project activities should be reviewed to determine whether they meet the criteria of eligibility for listing on the NRHP. Cultural resources listed on or eligible for listing on the NRHP are considered “significant” resources.
- If a development is within the viewshed of a national historic trail eligible for listing on the NRHP, the developer should evaluate the potential visual impacts on the trail associated with the proposed project. If impacts were to occur, mitigation measures such as vegetation or landscape screening could be employed. Other mitigation options are identified in section 5.7.1.3.
- If cultural resources are known to be present at the site, or if areas with a high potential to contain cultural material have been identified, consultation with the SHPO should be undertaken by the appropriate Federal agency (e.g., Western, the Service, USFS, or BLM). In instances where Federal oversight is not appropriate, developers can interact directly with the SHPO. Avoidance of these resources is always the preferred mitigation option. Other mitigation options include archaeological survey, excavation, data recovery, and monitoring (as warranted). If an area exhibits a high potential but no artifacts are observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report should be prepared documenting these activities. Other steps include the identification and implementation of measures to prevent potential looting/vandalism or erosion impacts, as well as educating workers and the public to make them aware of the consequences of unauthorized collection of artifacts.
- Periodic monitoring of significant cultural resources in the vicinity of development projects may help curtail potential looting/vandalism and erosion impacts. If impacts are

recognized early, additional actions can be taken before the resource is destroyed. Monitoring activities do not require Federal involvement.

- Cultural resources discovered during construction should immediately be brought to the attention of the responsible Federal agency. Work should be immediately halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation plans are being developed.
- If human remains are found on a development site, work should cease immediately in the vicinity of the find. The appropriate law enforcement officials and the appropriate Federal agency should be contacted. No material should be removed from the find location. Once it is determined that the remains belong to an archaeological site, the appropriate SHPO should be contacted to determine how the remains should be addressed.
- Significant cultural resources can be affected by soil erosion. See the measures discussed in section 5.2.1.7 for methods that could control soil erosion during a development project. Minimization of soil erosion would protect important resources from damage.

Additional site-specific measures may be identified and implemented to further reduce impacts; however, the Project is not expected to have a significant adverse effect on cultural, archaeological and historic resources.

4.20 Native American Religious Concerns

The Native American Graves Protection and Repatriation Act of 1990 allows tribes to protect American Indian graves and to repatriate human remains. Sunflower must comply with this act if a burial site is encountered during construction, as the Act applies to all developments regardless of the funding source. Any burial site identified, including tribal or pioneer, must be referred to the North Dakota Intertribal Reinterment Committee and the State Historical Society of North Dakota. The North Dakota Indian Affairs Commission was invited to the scoping meeting and to provide comments; no response has been received to date.

4.20.1 Existing Conditions

Existing Native American religious concerns were documented through contact with the tribes listed in Section 5.3 as part of the NEPA process and the NHPA Section 106 consultation process conducted by Western. The Standing Rock Sioux Tribe was the only tribe to respond to Western’s interconnection notification letter dated October 8, 2013. Through consultation, they expressed a general concern regarding possible archaeological and cultural sites in the project area. Specific sites or locations were not identified by the Tribe.

4.20.2 Potential Impacts

Direct Impacts

A significant impact would occur if the Project caused an unmitigated, adverse effect to a traditional cultural property (TCP) or a burial site. In the event that burials or cultural sites with

Native American religious values are identified during construction of the Project, work would halt within 200 feet of the site until Native Americans are notified and consulted about conservation measures.

If historic or prehistoric materials are discovered during monitoring of earth-disturbance construction activities, construction would be halted and Western would be notified in order to initiate procedures outlined in 36 CFR Part 800. These procedures would include evaluating the find for eligibility and determining appropriate treatment with the SHPO and the NDIRC.

Avoidance, Minimization and Best Management Practices

In addition to the measures noted above, Sunflower will implement avoidance and minimization measures and best management practices applicable to historic and cultural resources as identified in the Draft UGP Wind Energy PEIS (see PEIS sections 5.8.1.6 and 5.9.1.6) as listed above in Section 4.19; these will also serve to protect Native American religious concerns. Additional site-specific measures may be identified and implemented; however, the Project is not expected to have a significant adverse effect on Native American religious concerns.

4.21 Cumulative Effects

This section presents a discussion of the potential cumulative impacts associated with the Project. Cumulative impacts are defined in the Council of Environmental Quality (CEQ) regulations as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” [40 CFR 1508.7].

This evaluation of potential cumulative impacts from the Project is consistent with the following regulations and guidance:

- CEQ’s Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Part 1500-1508, 1970 as amended).
- EPA Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act (40 CFR Part 6 [2009]).
- Considering Cumulative Effects under the National Environmental Policy Act (CEQ 1997b).
- Consideration of Cumulative Impacts in EPA Review of NEPA Documents, EPA 315-R-99-002 (EPA 1999).
- Guidance on Past and Present Actions (CEQ 2005).

4.21.1 Methods for Identifying Cumulative Effects

Cumulative impacts are identified using the following general approach:

1. Identify appropriate level of analysis for each resource.

2. Identify resources for which no impacts are expected from the Project. These resources will not be considered further for cumulative impacts.
3. Describe current resource conditions and trends.
4. List the potential impact producing factors related to construction and operation of the Project, and their potential direct and indirect impacts to specific resources.
5. Identify the potential impacts of each action that might contribute to cumulative impacts.
6. Identify past, present, and reasonably foreseeable future actions that could affect resources.
7. Analyze the potential cumulative impacts.

In accordance with CEQ guidance (CEQ 1997b), the cumulative impacts analysis focuses on impacts that are “truly meaningful.” The level of analysis for each resource is commensurate with the intensity of the impacts identified in Section 4. The spatial and temporal bounds of the cumulative impact analysis vary by resource, and consist of the full extent impacts from both the Project and any of the reasonably foreseeable future actions. For many resources, the potential limit of Project effects is the Project construction footprint. For others the impacts will extend farther.

4.21.2 Past and Present Actions

Past and present actions are not identified individually; rather this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative impacts. Consequently, this cumulative impacts analysis does not attempt to quantify the impacts of past human actions by adding up all prior actions on an action-by-action basis. Current conditions have been impacted by innumerable actions over the last two centuries, and trying to isolate individual actions that continue to have residual impacts would be nearly impossible. The CEQ issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions” (CEQ 2005). Past actions are reflected in the baseline information presented in Section 4, which provides context for the cumulative impacts analysis.

4.21.3 Reasonably Foreseeable Future Actions

This section discusses the reasonably foreseeable future actions that have the potential to overlap spatially and temporally with the Project. As described by the CEQ (2005), “It is not practical to analyze how the cumulative effects of an action interact with the universe; the analysis of environmental effects must focus on the aggregate effects of past, present, and reasonably foreseeable future actions that are truly meaningful.”

Identified future actions were reviewed to determine if they should be considered further in the cumulative impacts analysis. Factors considered when identifying other actions to be included in the cumulative impacts analysis included the following:

- Whether the other action is likely or probable (i.e., reasonably foreseeable), rather than merely possible or speculative.
- The timing and location of the other action in relationship to the Project.
- Whether the other action and the Project would affect the same resources.
- The current conditions, trends, and vulnerability of resources affected by the other action.
- The duration and intensity of the impacts of the other action.
- Whether the impacts have been truly meaningful, historically significant, or identified previously as a cumulative impact concern.

A list of reasonably foreseeable actions in the region of the Project (see Table 18) was developed based on a search of projects listed on the PSC online case information, and other publicly available information. The list is limited to three proposed wind energy developments. In this area of North Dakota there are no transmission lines or other energy projects currently proposed, and there is little residential, commercial, or industrial development in the area.

Table 18. Reasonably Foreseeable Actions in the Vicinity of the Project

Project Name	Operator	Proposed Generation Capacity	County	STATE	Approximate Distance from Sunflower Project Area
Clean Energy 1	ALLETE Clean Energy	100 MW	Mercer	ND	6 miles
New Frontier Wind Energy Project	Meadowlark Wind I LLC	102 MW	McHenry	ND	83 miles
Thunder Spirit Wind Project	Wind Works Power Corp	150 MW	Adams	ND	49 miles
Wilton IV	Next Era Energy Resources, LLC	96 MW	Burleigh	ND	60 miles
Oliver III	Next Era Energy Resources, LLC	48 MW	Morton	ND	37 miles
Bison IV	Minnesota Power	210 MW	Oliver and Mercer	ND	14 miles

4.21.4 Potential Cumulative Effects

For cumulative impacts to occur, impacts from the Project would need to overlap in time and space with impacts from one or more of the reasonably foreseeable future actions that were identified. No cumulative impact would occur for resources where the Project would not have an impact; this would include the following resource areas:

- Environmental Justice
- Recreation

There would also be no cumulative impact where the Project would have an impact to a resource but this impact would not occur in the same time and space as the impact of a reasonably foreseeable action. This would include the following:

- Geology and Soils
- Air Quality
- Climate Change
- Water Resources
- Surface Waters and Wetlands
- Vegetation
- Land Use
- Visual Resources
- Noise
- Transportation
- Health and Safety
- Cultural, Historical and Archaeological Resources

Wind energy development is anticipated to have a positive cumulative impact on several resources, including air quality and socioeconomics.

Resource areas for which the Project may have cumulative impacts are therefore limited to visual resources and some types of wildlife including some listed species. Of the listed species, the Project is unlikely to have impacts to pallid sturgeon, piping plover, black-footed ferrets, and gray wolves due to lack of occurrence in the Project Area. Potential cumulative impacts may occur to whooping cranes and other avian species that migrate through the area due to their widespread occurrence. Cumulative visual impacts may occur due to the proximity of the proposed Clean Energy I wind farm.

The principal resources of concern for cumulative impacts are anticipated to be wildlife (particularly whooping cranes) and visual resources. Each of these is discussed below.

Wildlife

Sunflower believes that the Project can be designed to avoid direct impacts to wetlands, and that an individual permit will not be needed. In addition, Sunflower will implement shut-down protocols during migration periods as may be identified through Section 7 consultation. Consequently, Sunflower expects to have no impacts to whooping cranes or other wetland-dependent bird species, and would thus not contribute to cumulative impacts.

Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would utilize existing access roads and would not create additional wetland impacts.

Further, with the adoption of the UGP Wind Energy PEIS, it is expected that similar measures for wildlife protection would be implemented for most or all future wind energy development in the Upper Great Plains region, including requirements for buffers and/or curtailment during migration season and provision of mitigation if necessary to offset unavoidable or incidental impacts. Consequently, it is anticipated that the total cumulative impacts to whooping cranes and other wildlife from the Project and other reasonably foreseeable actions will be minimal.

Visual Resources

The Proposed Action will cause a minor cumulative impact to visual resources in the county in addition to the other reasonably foreseeable actions. The proposed Clean Energy I project would be located sufficiently close that turbines from both facilities could be visible from some areas. While this would represent a change in the visual quality of the area, it is one which is not necessarily viewed as adverse. Rather, many in the region view wind turbines as a source of income and a compatible element to a largely agricultural landscape. Sunflower will implement applicable measures to reduce visual impacts to the extent that they can be reduced, as identified in the Draft UGP Wind Energy PEIS. It is anticipated that future wind energy developments in the region would implement similar measures, helping to limit the cumulative impacts of the Project and other reasonably foreseeable actions in the area. Reconductoring of the Mandan-Ward and Ward-Bismarck transmission lines would have no discernable visual impact once construction is completed.

5.0 AGENCIES CONTACTED

5.1 Federal Agencies

The following federal agencies were contacted as part of the EA scoping process:

- USACE
- EPA
- USFWS
- USDA (Farm Service Agency and Rural Utilities Service)
- Federal Energy Regulatory Commission (FERC)
- Advisory Council on Historic Preservation
- FEMA
- U.S. Department of Transportation (DOT)
- U.S. Department of Interior, Office of Environmental Policy and Compliance
- U.S Geographic Survey
- Federal Highway Administration (FHWA)
- NRCS
- FAA

5.2 State and Local Agencies

The following state and local agencies have been contacted as part of the EA scoping process:

- ND Department of Agriculture
- NDGFD
- NDDOT
- PSC
- North Dakota SHPO

- State Historical Society of North Dakota
- North Dakota Indian Affairs Commission
- North Dakota State Land Department
- North Dakota Parks and Recreation Department
- Morton County Soil Conservation District
- Central Stark and Western Soil Conservation District
- Office of the Governor
- North Dakota Senate and House of Representatives
- North Dakota Department of Commerce
- Morton County Commission
- Stark County Commission
- Morton County Farm Services Agency
- Stark County Farm Services Agency
- Hebron School District
- Cities of Hebron, Dickinson, Taylor, Richardton and Glen Ullin

5.3 Native American Tribes

Pursuant to the NHPA and the American Indian Religious Freedom Act (AIRFA) of 1978, and in an effort to identify any other significant cultural resources that may be affected by the Project, Western initiated consultation with Native American Tribes that may have a historical interest in the Project area. A letter inviting comments regarding any religious or cultural significance of the Project location was sent out on October 8, 2013, to nine Tribes within the Upper Great Plains Region of Western:

- Cheyenne River Reservation, Montana
- Crow Creek Reservation, South Dakota
- Fort Berthold Reservation (Three Affiliated Tribes), North Dakota
- Fort Peck Indian Reservation, Montana
- Lower Brule Reservation, South Dakota
- Rosebud Indian Reservation, South Dakota
- Santee Sioux Nation, Nebraska
- Sisseton Wahpeton Oyate, North and South Dakota
- Standing Rock Sioux Tribe, North and South

5.4 Dakota Other Organizations

The following non-governmental organizations have also been contacted as part of the EA scoping process, but no response has yet been received:

- The Nature Conservancy
- Sierra Club
- Dakota Prairie Audubon Society
- Ducks Unlimited
- Pheasants Forever, Inc.

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Appendix A
Scoping Information

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- Tribal Notification Letter
- Tribal Mailing List

Western conducted formal scoping for the proposed Project. While scoping is not required for an Environmental Assessment (EA) (40 CFR Part 1501), scoping is encouraged by the Council on Environmental Quality (CEQ) as a means to identify potential issues related to proposed federal actions.

On August 5, 2013, notice of the proposed Project and an upcoming scoping meeting was sent to property owners within and adjacent to the Project Area. The letter described the Project and established a scoping period from August 22 through September 23, 2013. A sample notification letter is provided in Appendix A. The meeting was also advertised in the Dickinson Press and local radios stations.

On August 22, 2013, Western held a scoping meeting for the Project. The meeting was held from 5:00 – 8:00 p.m. at the Hampton Inn and Suites in Dickinson, North Dakota. A total of 22 people attended the meeting:

- Western: Lou Hanebury, Environmental Protection Specialist;
- Infinity Wind/Sunflower Wind Project, LLC:
    - Casey Willis, Project Manager;
    - Bob Baur, Senior Land Agent; and
    - Dale Bennett, Environmental Consultant (Tetra Tech, Inc.); and
- Eighteen private citizens, as indicated on the sign-in sheet (see Appendix A).

Lou Hanebury opened the meeting with a brief description of the Project and a discussion of Western's responsibilities under the National Environmental Policy Act (NEPA). Mr. Hanebury reviewed the steps for preparation of an EA, including the scoping period and opportunities to submit comments. Mr. Hanebury noted that forms for submitting written comments were available at the meeting and that comments could be submitted by email.

Casey Willis then described the proposed 110 megawatt (MW) Project, located in Stark and Morton counties. Mr. Willis discussed the state of the conceptual design at that point, and presented a map showing preliminary turbine corridors. Then, Mr. Willis and Mr. Hanebury took questions from attendees.

Fifteen individuals submitted comment forms requesting a copy of the Draft EA. None of these individuals indicated any other comment. Two email comments were subsequently received, one expressing general opposition to wind turbines and one requesting more detail on the design of the Project (see Appendix B).

«First Name»	«Last Name»	«Job Title»	«Company/agency»	«Address 1»	«Address 2»	«City»	«State»	«Zip»
John	Fowler	Executive Director	Advisory Council on Historic Preservation	Old Post Office Building, Suite 803	1100 Pennsylvania Avenue NW	Washington	DC	20004
Ken	Zander	Chairman	Stark County Commission	Stark County Courthouse	PO Box 130	Dickinson	ND	58601
Russ	Hoff	Vice Chairman	Stark County Commission	Stark County Courthouse	PO Box 130	Dickinson	ND	58601
Pete	Kuntz	Commissioner	Stark County Commission	Stark County Courthouse	PO Box 130	Dickinson	ND	58601
Duane	Wolf	Commissioner	Stark County Commission	Stark County Courthouse	PO Box 130	Dickinson	ND	58601
Jay	Elkin	Commissioner	Stark County Commission	Stark County Courthouse	PO Box 130	Dickinson	ND	58601
Bruce	Strinden	Chair	Morton County Commission	Morton County Courthouse	210 2nd Ave. NW	Mandan	ND	58554
Andy	Zachmeier	Vice Chair	Morton County Commission	Morton County Courthouse	210 2nd Ave. NW	Mandan	ND	58554
Jim	Boehm	Commissioner	Morton County Commission	Morton County Courthouse	210 2nd Ave. NW	Mandan	ND	58554
Ron	Leingang	Commissioner	Morton County Commission	Morton County Courthouse	210 2nd Ave. NW	Mandan	ND	58554
Cody	Schulz	Commissioner	Morton County Commission	Morton County Courthouse	210 2nd Ave. NW	Mandan	ND	58554
Bonnie	Twogood	District Manager	Central Stark & Western Soil Conservation District		2948 4th Ave. West, Room C	Dickinson	ND	58601
Jim	Hophauf	District Board Chair	Morton County Soil Conservation District		3360 58th St.	Flasher	ND	58535
Lawrence & Amy	Igl	President	Dakota Prairie Audubon Society		1514 Skyline Lane	Jamestown	ND	58401
Steve	Adair	Regional Director	Ducks Unlimited Great Plains Regional Office		2525 River Road	Bismarck	ND	58503-9011
Pete	Solemsaas	County Executive Director	Stark County Farm Service Agency		2493 4th Ave. W Room B	Dickinson	ND	58601-2623
Linda	Urlacher	County Executive Director	Morton County Farm Service Agency		2540 Overlook Ln	Mandan	ND	58554
Barry	Cooper	Regional Administrator	Federal Aviation Administration, Great Lakes Region	O'Hare Lake Office Center	2300 East Devon Avenue	Des Plaines	IL	60018
Steve	Hardegen	Regional Environmental Officer	Federal Emergency Management Agency Region VIII	Environmental & Historic Preservation	Denver Federal Center, Building 710, Box 25267	Denver	CO	80225-0267
Jeff	Wright	Director	Federal Energy Regulatory Commission	Office of Energy Projects	888 First Street, NE	Washington	DC	20426
Wendall	Meyer	Division Administrator	Federal Highway Administration	North Dakota Division	1471 Interstate Loop	Bismarck	ND	58503-0567
Mary	Podoll	State Conservationist	Natural Resources Conservation Service	North Dakota State Office	220 East Rosser Ave, Federal Building, Rm 270	Bismarck	ND	58501
Jay	Fuhrer	District Conservationist	Natural Resources Conservation Service	Bismarck Field Office	916 E. Interstate Ave, Suite 6	Bismarck	ND	58503
Terrance	Gisvold	Assistant State Conservationist	Natural Resources Conservation Service	Dickinson Area Office	135 Sims St., Ste 210	Dickinson	ND	58601
Doug	Goehring	Agriculture Commissioner	North Dakota Department of Agriculture		600 East Boulevard Avenue, Dept 602	Bismarck	ND	58505-0020
Paul	Lucy	Director	North Dakota Department of Commerce	Economic Development and Finance Division	PO Box 2057	Bismarck	ND	58502-2057
Kevin	Levi	District Engineer	North Dakota Department of Transportation	Bismarck District	218 South Airport Road	Bismarck	ND	58504-6003
Larry	Gangl	District Engineer	North Dakota Department of Transportation	Dickinson District	1700 Third Avenue West, Suite 101	Dickinson	ND	58601-3009
Terry	Steinwand	Director	North Dakota Game and Fish Department		100 N. Bismarck Expressway	Bismarck	ND	58501-5095
Kelly	Armstrong	Senator	North Dakota State Senate	District 36	513 Elks Drive	Dickinson	ND	58601-2947
Alan	Fehr	Representative	North Dakota House of Representatives	District 36	10641 Highway 10	Dickinson	ND	58601-9567
Mike	Schatz	Representative	North Dakota House of Representatives	District 36	400 Ninth St. East	New England	ND	58647-7528
Scott	Davis	Executive Director	North Dakota Indian Affairs Commission	600 East Boulevard Avenue	1st Floor Judicial Wing, Rm 117	Bismarck	ND	58505
Mark	Zimmerman	Director	North Dakota Parks and Recreation Department		1600 E. Century Ave, Suite 3	Bismarck	ND	58503
Darrell	Nitschke	Executive Secretary	North Dakota Public Service Commission		600 E. Boulevard Avenue, Dept 408	Bismarck	ND	58505-0480
Fern	Swenson	Deputy State Historic Preservation Officer	North Dakota State Historic Preservation Office		612 East Boulevard Ave.	Bismarck	ND	58505
Lance	Gaebe	Land Commissioner	North Dakota State Land Department	1707 North 9th Street	PO Box 5523	Bismarck	ND	58506-5523
Jack	Dalrymple	Governor	Office of the Governor		600 East Boulevard Avenue	Bismarck	ND	58505-0001
Jeffrey	Anderson		Pheasants Forever	Southwestern Area Chapter 276	901 Sims St.	Dickinson	ND	58601-3941
Wayde	Schafer	Chairperson	Sierra Club	North Dakota Office	311 North Mandan St, Suite 1	Bismarck	ND	58501
Merlan	Paaverud, Jr.	Director	State Historic Society of North Dakota	State Historic Preservation Office	612 East Bouleavard Avenue	Bismarck	ND	58505
Bob	Paulson	Western Dakotas Program Director	The Nature Conservancy		822 Main Street	Rapid City	SD	57701
Daniel	Cimarosti	Regulatory Program Manager	U.S. Army Corps of Engineers, Omaha District	ND Regulatory Office	1513 South 12th Street	Bismarck	ND	58504-6640
Matthew	Ponish	National Environmental Compliance	U.S. Department of Agriculture		1400 Independence Ave., SW STOP 513	Washington	DC	20250
Willie	Taylor, Ph.D.	Director	U.S. Department of the Interior	Office of Environmental Policy and Compliance	1849 C Street, NW MS 2462	Washington	DC	20240
Suzanne	Bohan	NEPA Program Director	U.S. Environmental Protection Agency	EPA Region 8 (8EPR-N)	1595 Wynkoop St.	Denver	CO	80202-1129
Shaun	McGrath	Regional Administrator	U.S. Environmental Protection Agency, Region 8	EPA Region 8 (8EPR-N)	1595 Wynkoop St.	Denver	CO	80202-1129
Jeff	Towner	Field Supervisor	U.S. Fish & Wildlife Service	North Dakota Field Office	3425 Miriam Avenue	Bismarck	ND	58501-7926
Leon	Carl	Regional Director	U.S. Geological Survey	Midwest Region	1451 Green Rd.	Ann Arbor	MI	48105
Kevin	Cramer	Congressman	United States House of Representatives	220 East Rosser Avenue	328 Federal Building	Bismarck	ND	58501
John	Hoeven	U.S. Senator	United States Senate		338 Russell Senate Office Building	Washington	DC	20510
Heidii	Heitkamp	U.S. Senator	United States Senate		SH-502 Hart Senate Office Building	Washington	DC	20510
Kevin	Nelson	Superintendent	Hebron School District		PO Box Q	Hebron	ND	58638

«First Name»	«Last Name»	«Job Title»	«Company/agency»	«Address 1»	«Address 2»	«City»	«State»	«Zip»
Grant	Walth	Mayor	City of Hebron		PO Box V	Hebron	ND	58638
Dennis	Johnson	Mayor, Commission President	City of Dickinson	City Hall	99 2nd St. E	Dickinson	ND	58601
Russ	Myran	Mayor	City of Taylor		PO Box 68	Taylor	ND	58656-0068
Frank	Kirschenheiter	Mayor	City of Richardton		120 N Main	Richardton	ND	58652
Ray	Haverluk	Mayor	City of Glen Ullin		PO Box 202	Glen Ullin	ND	58631-0202

Parcel Name	Address	City	State	Zip
Alfred & Margery Underdahl Trustees	[redacted]	Hebron	North Dakota	58638
Anheluk, Richard D	[redacted]	Rapid City	South Dakota	57702-1704
Archie J & Anne Marie Wanner	[redacted]	Hebron	North Dakota	58638
Armin Heinle	[redacted]	McClusky	North Dakota	58463
August C Draeb	[redacted]	Surprise	Arizona	85374
Beaver Creek Farms Trust	[redacted]	Richardton	North Dakota	58652
Bennie J Schneider	[redacted]	Richardton	North Dakota	58652
Beverly Ann Potter	[redacted]	Bismarck	North Dakota	58501
Bonita K Schantz	[redacted]	Hebron	North Dakota	58638
Brandt, Dale	[redacted]	Horace	North Dakota	58047
Brandt, Dion	[redacted]	Wyoming	Minnesota	55092
Chester M & Bonita K Schantz	[redacted]	Hebron	North Dakota	58638
Clint Scott Schneider	[redacted]	Dickinson	North Dakota	58601
Dale C Heinle	[redacted]	Hebron	North Dakota	58638
David J & Claudia Meberg	[redacted]	Hebron	North Dakota	58638
David K Jose	[redacted]	North Oaks	Minnesota	55127
David L Opp	[redacted]	Hebron	North Dakota	58638
Dean A Klein	[redacted]	North Oaks	Minnesota	55127
Diede, Alfred & Lorine	[redacted]	Richardton	North Dakota	58652
Diede, Dale	[redacted]	Richardton	North Dakota	58652
Diede, Gloria Ann	[redacted]	Mandan	North Dakota	58554
Dittus, Larry And Margaret	[redacted]	Hebron	North Dakota	58638
Douglas Lennick	[redacted]	Minneapolis	Minnesota	55410
Draeb, Jon D	[redacted]	Hebron	North Dakota	58638
Draeb, Mark S	[redacted]	Hebron	North Dakota	58639
Duane & Rita Opp	[redacted]	Hebron	North Dakota	58638
Eleanore R Opp Trust	[redacted]	Hebron	North Dakota	58638

Parcel Name	Address	City	State	Zip
Elkins, Vivian Etal	[redacted]	Taylor	North Dakota	58656
Ellen A/Family Trust Perkins	[redacted]	Carmichael	California	95608
Erdle, Mitch A	[redacted]	Hebron	North Dakota	58640
Evangeline Treiber	[redacted]	Hebron	North Dakota	58638
Eveline Schulz	[redacted]	Longview	Washington	98632
Follman, Randy & Kristi Dick	[redacted]	Leeds	North Dakota	58346
Fred J & Arlene M Berger	[redacted]	Mandan	North Dakota	58554
Friedt, Arnie	[redacted]	Richardton	North Dakota	58562
Friez, Arlis C/O Krein, Arthur	[redacted]	Richardton	North Dakota	58568
Gappert, Robert	[redacted]	Mandan	North Dakota	58555
Gary Langer	[redacted]	Bismarck	North Dakota	58504
Gary Schantz	[redacted]	Glen Ullin	North Dakota	58631
Gary W/& Leslie C Schantz Schantz	[redacted]	Glen Ullin	North Dakota	58631
George & Karen Saxowsky	[redacted]	Hebron	North Dakota	58638
George M Ding	[redacted]	Glen Ullin	North Dakota	58631
Glen Ullin S D #48	[redacted]	Glen Ullin	North Dakota	58631
Gloria Ann Diede	[redacted]	Mandan	North Dakota	58554
Gomke, Carol Etal	[redacted]	Flasher	North Dakota	58535
Gomke, Marlene & Ervin	[redacted]	Mandan	North Dakota	58556
Hansen Et Al, Verna	[redacted]	Bismarck	North Dakota	58501
Hansen, William A	[redacted]	Seaside Park	New Jersey	08752
Hefta, Troy M & Terry J &	[redacted]	West Fargo	North Dakota	58078
Heinle Trust, Kathleen K	[redacted]	Maple Grove	Minnesota	55311-3527
Heinle, Chad	[redacted]	Chaska	Minnesota	55318
Heinle, Dale & Constance	[redacted]	Hebron	North Dakota	58638
Heinle, Harlen Etal	[redacted]	Marion	Illinois	62959
Heinle, Ida Life Estate	[redacted]	Marion	Illinois	62959

Adjacent Neighbor List

Parcel Name	Address	City	State	Zip
Heinle, Jeffrey	[redacted]	Hebron	North Dakota	58638
Heinle, Justin	[redacted]	Bismarck	North Dakota	58503
Heinle, Malcolm J	[redacted]	Eagan	Minnesota	55121
Helen K Hassebrock	[redacted]	Dickinson	North Dakota	58601
Hoerauf Fam Rev Trust	[redacted]	Bismarck	North Dakota	58501
Hoerauf Family Farm Ptshp Llp	[redacted]	Fargo	North Dakota	58102
Hoerauf, Lyle R	[redacted]	Hebron	North Dakota	58638
Hoerauf, Roland	[redacted]	Fargo	North Dakota	58102
Hoff, Brock N & Casey M	[redacted]	Richardton	North Dakota	58563
Ida Heinle	[redacted]	Marion	Illinois	62959
Ida Langer	[redacted]	Hebron	North Dakota	58638
James C Schaaf	[redacted]	Glen Ullin	North Dakota	58631
Janet Sayler	[redacted]	Hebron	North Dakota	58638
Jeffrey Heinle	[redacted]	Hebron	North Dakota	58638
Jerry V Kuntz	[redacted]	Hebron	North Dakota	58638
John E Langer	[redacted]	Mesa	Arizona	85215
Jose, David	[redacted]	North Oaks	Minnesota	55127
Kenneth R Schatz	[redacted]	Granite City	Illinois	62040
Kevin & Antoinette Staiger	[redacted]	Hebron	North Dakota	58638
Kitzan, Brian	[redacted]	Bismarck	North Dakota	58504
Kitzan, Florence	[redacted]	Hebron	North Dakota	58638
Kitzan, Gregory Etal	[redacted]	Hebron	North Dakota	58638
Kitzan, Hillia Life Estate	[redacted]	Richardton	North Dakota	58652
Kitzan, Perry & Cary	[redacted]	Richardton	North Dakota	58652
Kitzan, Steven	[redacted]	Richardton	North Dakota	58652
Klein, Delores	[redacted]	Bismarck	North Dakota	58501
Krein, Kenneth W	[redacted]	Richardton	North Dakota	58564

Adjacent Neighbor List

Parcel Name	Address	City	State	Zip
Kreis, Russell C	[redacted]	Hebron	North Dakota	58638
Larry Heinle	[redacted]	Bismarck	North Dakota	58501
Larry L & Margaret Dittus	[redacted]	Hebron	North Dakota	58638
Larry/Et Al Schroeder	[redacted]	Hebron	North Dakota	58638
Lauren Cahterine Dietemann Trust	[redacted]	Dickinson	North Dakota	58602
Leingang, Scott & Amy	[redacted]	Richardton	North Dakota	58652
Leslie C. Schantz	[redacted]	Glen Ullin	North Dakota	58631
Leutz, Phyllis	[redacted]	Hebron	North Dakota	58638
Lorina Schantz	[redacted]	Hebron	North Dakota	58638
Luella Gomke	[redacted]	Big Arm	Montana	59910
Lyle & Brenda Voth	[redacted]	Hebron	North Dakota	58638
Lyle R Hoerauf	[redacted]	Hebron	North Dakota	58638
Lynn J Underdahl	[redacted]	Hebron	North Dakota	58638
Matthew Miller	[redacted]	Glen Ullin	North Dakota	58631
Meberg, David & Claudia	[redacted]	Hebron	North Dakota	58638
Mike J Gerving	[redacted]	Glen Ullin	North Dakota	58631
Mildred M Schneider	[redacted]	Horace	North Dakota	58047
Miles J Schantz	[redacted]	Hebron	North Dakota	58638
Opp, David L	[redacted]	Hebron	North Dakota	58638
Opp, Duane S	[redacted]	Hebron	North Dakota	58638
Phyllis M & Roger F Leutz	[redacted]	Hebron	North Dakota	58638
R Stanley Schneider	[redacted]	Hebron	North Dakota	58638
Randall F Schantz	[redacted]	Glen Ullin	North Dakota	58631
Raymond A Vetter	[redacted]	Elgin	North Dakota	58533
Raymond Diede	[redacted]	Bismarck	North Dakota	58503
Reich, Dennis & Donna	[redacted]	Richardton	North Dakota	58565
Reich, Dori	[redacted]	Hebron	North Dakota	58641

Parcel Name	Address	City	State	Zip
Richard A & Loretta Schantz Family Trust	[redacted]	Glen Ullin	North Dakota	58631
Richard W & Kathleen M Zimmerman	[redacted]	Bismarck	North Dakota	58501
Robert B & Jessica G Scull	[redacted]	Hebron	North Dakota	58638
Robert R & Kathleen Schneider	[redacted]	Spearfish	South Dakota	57783
Rodney & Karla Staiger	[redacted]	Hebron	North Dakota	58638
Roger & Sheila Schantz	[redacted]	Glen Ullin	North Dakota	58631
Roger Vetter	[redacted]	Hebron	North Dakota	58638
Ronald Schantz	[redacted]	Hebron	North Dakota	58638
Russell C Kreis	[redacted]	Hebron	North Dakota	58638
Schank, Dale	[redacted]	Mandan	North Dakota	58557
Schantz, Bonita K	[redacted]	Hebron	North Dakota	58638
Schantz, Chester M	[redacted]	Hebron	North Dakota	58638
Schantz, Miles J	[redacted]	Hebron	North Dakota	58638
Schlenvogt, Timothy	[redacted]	Brighton	Colorado	80602
Schneider Family Land Trust	[redacted]	Hebron	North Dakota	58642
Schneider, Bennie J & Helen	[redacted]	Richardton	North Dakota	58566
Schneider, Clint	[redacted]	Dickinson	North Dakota	58601
Schneider, Clint S	[redacted]	Medora	North Dakota	58645
Schneider, Gailen & Linda	[redacted]	Hebron	North Dakota	58643
Schneider, Mildred	[redacted]	Horace	North Dakota	58047
Schneider, R Stanley	[redacted]	Hebron	North Dakota	58638
Schneider, R Stanley	[redacted]	Hebron	North Dakota	58638
Schneider, Richard	[redacted]	Hebron	North Dakota	58638
Schneider, Scott	[redacted]	Richardton	North Dakota	58652
Staiger, David & Cynthia Funk	[redacted]	Moorhead	Minnesota	56560-5411
State Of North Dakota	[redacted]	Bismarck	North Dakota	58506
Steve & Ruth Hubsmith, Trustees	[redacted]	Twin Falls	Idaho	83301

Adjacent Neighbor List

Parcel Name	Address	City	State	Zip
Terras, Timothy H Etal	[redacted]	Hebron	North Dakota	58645
Terry Meuchel	[redacted]	Hebron	North Dakota	58638
Terry Schantz & Roger Schantz Trstz	[redacted]	Glen Ullin	North Dakota	58631
Tim Meuchel	[redacted]	Glen Ullin	North Dakota	58631
Treiber, Reuben	[redacted]	Hebron	North Dakota	58638
Trustees Hansen Trust	[redacted]	Hebron	North Dakota	58638
Underdahl Family Trust, A & M	[redacted]	Hebron	North Dakota	58638
Underdahl, Lynn J	[redacted]	Hebron	North Dakota	58639
Vetter, Raymond A	[redacted]	Elgin	North Dakota	58533
Vetter, Roger	[redacted]	Hebron	North Dakota	58638
Virginia J & Eugene P Veil	[redacted]	Bismarck	North Dakota	58503
Vivian J & Roy H Bauer	[redacted]	Bismarck	North Dakota	58503
Voth, Lyle And Brenda	[redacted]	Hebron	North Dakota	58638
Wanner, Clyde & Rochelle	[redacted]	Dickinson	North Dakota	58601
Wetzstein, Dawn M	[redacted]	Bismarck	North Dakota	58503
Will, Edith C/O Krein, Arthur	[redacted]	Richardton	North Dakota	58569
William A Hansen	[redacted]	Seaside Park	New Jersey	8752
William C/Residuary Trust Hansen	[redacted]	Dickinson	North Dakota	58601
Wm G Jones	[redacted]	Glen Ullin	North Dakota	58631
Zhorela, Tamra Etal	[redacted]	Grand Forks	North Dakota	58631
Zimmerman, Richard	[redacted]	Bismarck	North Dakota	58501

Client:

INFINITY WIND POWER

Account #	305192	Ad #	1761049
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Fax:			
Address:	3760 STATE ST 102		
	SANTA BARBARA, CA 93105		

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Paid Amount:	$0.00
Balance:	$30.40

Page 1 of 1

PUBLIC INPUT ENCOURAGED!

Public comments are sought to define the scope and alternatives for an Environmental Assessment of a proposed wind energy facility in Stark and Morton Counties, to the south of Hebron and west of Glen Ullin, North Dakota. The proposed project, to be called Sunflower Wind Project, will include up to 50 wind turbine generators, an underground power collection system, project substation, a new overhead transmission line, access roads, and a maintenance and operation center. Construction of the Sunflower project is proposed to begin as early as the beginning of 2015.

Western Area Power Administration will hold a public scoping meeting to define the scope of the Sunflower Wind Project Environmental Assessment. The meeting location is handicapped accessible.

To learn more about this project and to share your ideas, join us at:

5 to 8 pm MST Thursday,
August, 22 2013
Hampton Inn and Suites
110 14th Street West
Dickinson, North Dakota 58601

For more information about the proposed project or to be added to the project mailing list, please contact:

Lou Hanebury, Environmental
Protection Specialist
Western Area Power Administration
P.O. Box 35800
Billings, MT 59107-5800
PHONE: (800) 358-3415, FAX:
(406) 255-2900
eMail: hanebury@wapa.gov
(Published August 6 & 7, 2013)

Public Input Encouraged!

Public comments are sought to define the scope and alternatives for an Environmental Assessment of a proposed wind energy facility in Stark and Morton Counties, to the south of Hebron and west of Glen Ullin, North Dakota. The proposed project, to be called Sunflower Wind Project, will include up to 50 wind turbine generators, an underground power collection system, project substation, a new overhead transmission line, access roads, and a maintenance and operation center.

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5 to 8 pm (MST)
Thursday, August 22, 2013
Hampton Inn and Suites
110 14th Street West
Dickinson, North Dakota 58601

For more information about the proposed project or to be added to the project mailing list, please contact:

Lou Hanebury, Environmental Protection Specialist
Western Area Power Administration
P.O. Box 35800 • Billings, MT 59107-5800
PHONE: (800) 358-3415, FAX: (406) 255-2900
eMail: hanebury@wapa.gov

THE DICKINSON PRESS

Published August 31, 2013, 12:07 AM

Wind energy project proposed for Stark, Morton counties

A 30- to 50-turbine wind power project could be coming to Stark and Morton counties.

By: **Katherine Lymn**, The Dickinson Press

A 30- to 50-turbine wind power project could be coming to Stark and Morton counties.

The community has reacted positively to the $140 million project that's planned to be completed by the end of 2015, Infinity
in an email.

The project is expected to produce enough power for about 38,000 homes annually.

Infinity has requested an interconnection with the Western Area Power Administration's transmission line that runs from Di

The 9,000-acre project will sit south of Hebron and west of Glen Ullin.

Hebron Mayor Grant Walth said he hasn't heard any opposition, and that it's likely because of the money to be made from

Lou Hanebury of the Western Area Power Administration was in the area last week for a public input meeting on the projec
and that a number of people came because they were interested in leasing their land for it.

According to the Natural Resources Defense Council, in southwestern North Dakota, there are five existing wind energy pl

Infinity also has two other wind power projects proposed for North Dakota, in Mercer and Oliver counties.

The "public scoping period" continues through Sept. 23. Anyone can send comments to Hanebury at hanebury@wapa.gov
Administration: P.O. Box 35800, Billings, MT 59107.

Tags: energy, news, wind, project

Radio AD:
Western Area Power Administration invites you to attend a public scoping meeting, to help define the scope of an Environmental Assessment of the Sunflower Wind Project, a proposed wind energy project in Stark and Morton Counties, North Dakota. The proposed project will include up to 50 wind turbine generators, an underground power collection system, project substation, a new overhead transmission line, access roads, and a maintenance and operation center. Construction of the Sunflower project is proposed to begin as early as the beginning of 2015.

The public meeting will be held Thursday, August 22nd from 5 to 8 PM at the Hampton Inn and Suites in Dickinson. For more information, please call Lou Hanebury at 1-800-358-3415.

Department of Energy
Western Area Power Administration
Upper Great Plains Customer Service Region
P.O. Box 35800
Billings, MT 59107-5800

AUG 0 5 2013

B0403.BL

Dear Customers and Interested Parties:

Western Area Power Administration (Western) is announcing the scoping period for the Sunflower Wind Project Environmental Assessment (EA). The Sunflower Wind Project involves the proposed construction of an approximate 80-MW wind farm generating facility that includes up to 50 turbines, an underground power collection system, a substation, a new overhead transmission line, access roads, and a maintenance and operation center. The Sunflower Wind Project will be located to the south of Hebron and west of Glen Ullin in Stark and Morton Counties, North Dakota.

The location of the project is reflected in the enclosed figure. The proposed project would interconnect with Western's Dickinson to Mandan 230-kV transmission line. Western is preparing an EA in order to comply with the National Environmental Policy Act (NEPA), which requires Western to take into account the environmental impacts that could result from an action. NEPA also requires that federal agencies seek public input on proposed projects.

The wind farm is sited on private land holdings, some of which include Conservation Reserve Program (CRP) contract lands. Wind turbines are proposed to be installed on land with CRP contracts. The land has traditionally been used for agricultural and grazing and, except for the contracted CRP land, will continue as grazing lands and agricultural fields.

The scoping period provides an opportunity for the public, and the federal, state, and local agencies, as well as tribal governments, to identify issues or alternatives that help define the scope of the EA. The public scoping period begins on August 22, 2013, and ends on September 23, 2013. One public scoping meeting will be held to provide an opportunity for the public to submit scoping comments on the proposal in person, and talk to staff working on the project. The scoping meeting will be held on August 22, 2013, between 5:00 p.m. and 8:00 p.m. at the Hampton Inn and Suites, 110 14th Street West, Dickinson, North Dakota, 58601.

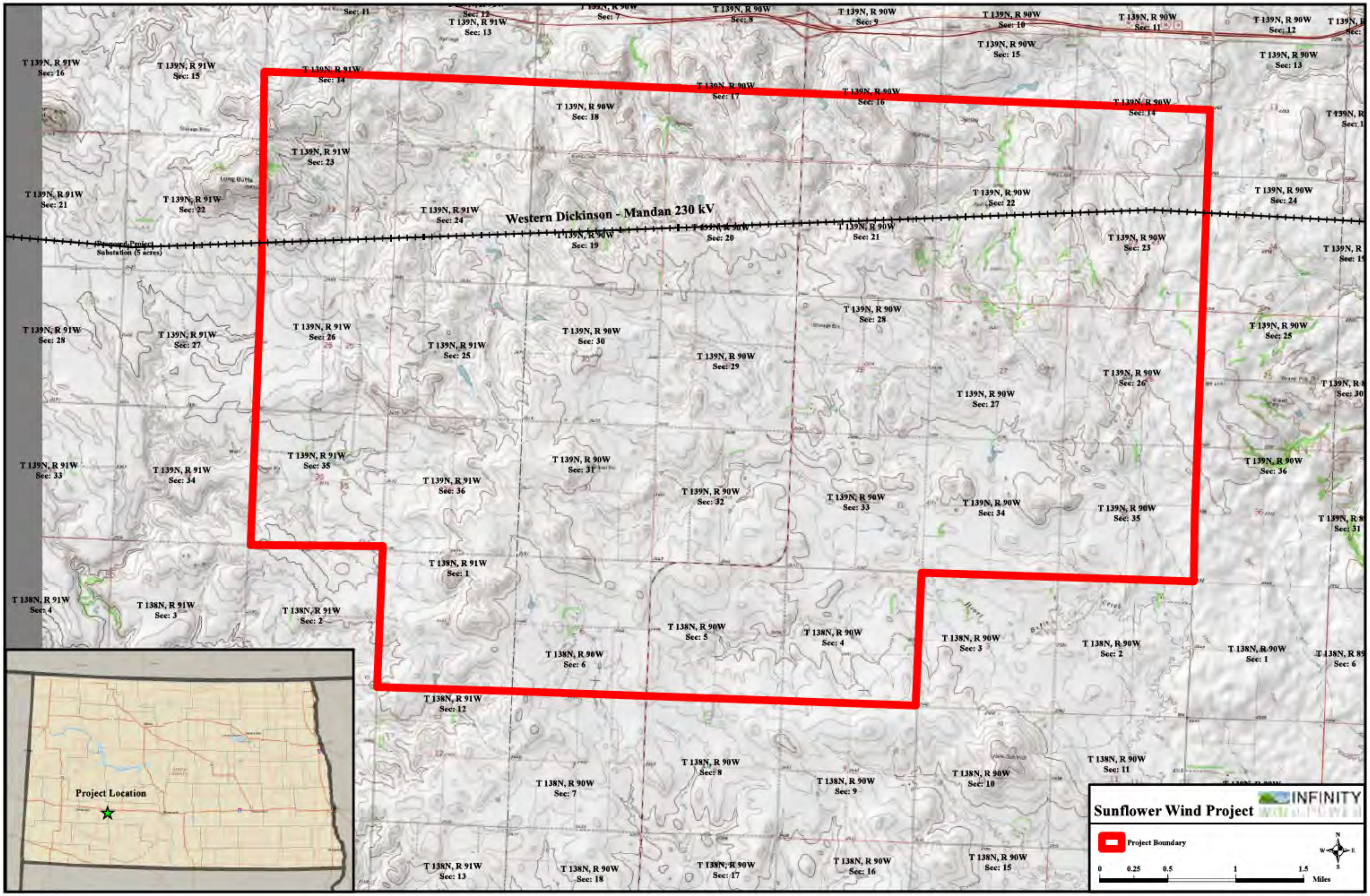
Comments will be accepted at the scoping meeting, by letter to me at the above address, by phone at (406) 255-2812, or by e-mailing me at hanebury@wapa.gov . Please refer to the Sunflower Wind Project in your correspondence. Send all comments by close of business September 23, 2013.

Sincerely,

Lou Hanebury

Lou Hanebury
Environmental Protection Specialist

Enclosure


Sunflower Wind Project
INFINITY
Project Boundary
0 0.25 0.5 1 1.5 Miles
Western Dickinson - Mandan 230 kV
Proposed Project Substation (5 acres)
Project Location
T 139N, R 91W Sec: 14
T 139N, R 91W Sec: 23
T 139N, R 91W Sec: 24
T 139N, R 91W Sec: 26
T 139N, R 91W Sec: 25
T 139N, R 91W Sec: 35
T 139N, R 91W Sec: 36
T 138N, R 91W Sec: 1
T 138N, R 91W Sec: 12
T 139N, R 90W Sec: 18
T 139N, R 90W Sec: 17
T 139N, R 90W Sec: 16
T 139N, R 90W Sec: 14
T 139N, R 90W Sec: 19
T 139N, R 90W Sec: 20
T 139N, R 90W Sec: 21
T 139N, R 90W Sec: 22
T 139N, R 90W Sec: 23
T 139N, R 90W Sec: 30
T 139N, R 90W Sec: 29
T 139N, R 90W Sec: 28
T 139N, R 90W Sec: 27
T 139N, R 90W Sec: 26
T 139N, R 90W Sec: 31
T 139N, R 90W Sec: 32
T 139N, R 90W Sec: 33
T 139N, R 90W Sec: 34
T 139N, R 90W Sec: 35
T 138N, R 90W Sec: 6
T 138N, R 90W Sec: 5
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T 138N, R 90W Sec: 2
T 138N, R 90W Sec: 1
T 138N, R 90W Sec: 7
T 138N, R 90W Sec: 8
T 138N, R 90W Sec: 9
T 138N, R 90W Sec: 10
T 138N, R 90W Sec: 11
T 138N, R 90W Sec: 18
T 138N, R 90W Sec: 17
T 138N, R 90W Sec: 16
T 138N, R 90W Sec: 15
T 138N, R 91W Sec: 13
T 138N, R 91W Sec: 2
T 138N, R 91W Sec: 3
T 138N, R 91W Sec: 4
T 139N, R 91W Sec: 16
T 139N, R 91W Sec: 15
T 139N, R 91W Sec: 21
T 139N, R 91W Sec: 22
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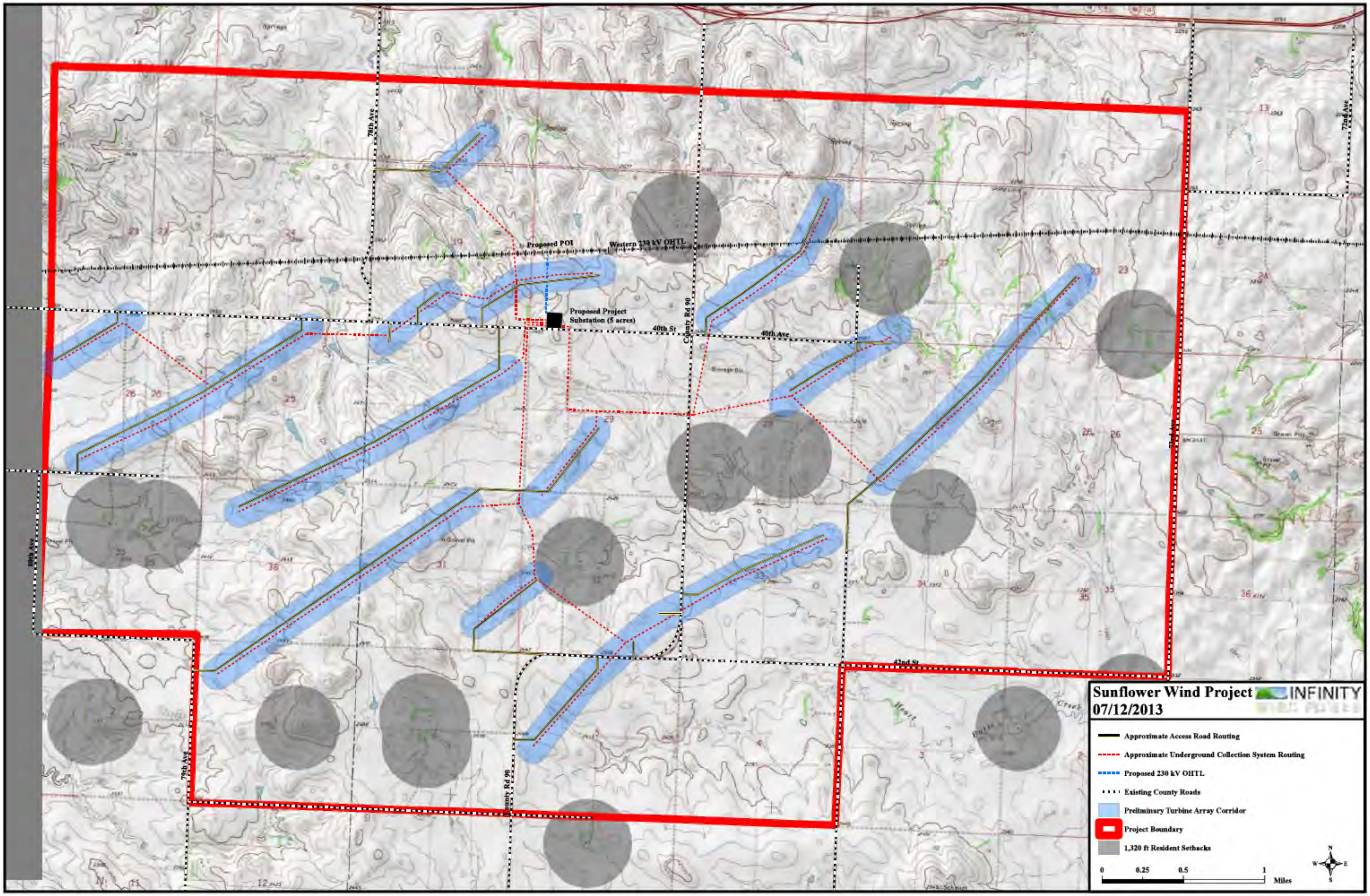
T 139N, R 90W Sec: 25
T 139N, R 90W Sec: 36


Sunflower Wind Project
INFINITY
07/12/2013
Approximate Access Road Routing
Approximate Underground Collection System Routing
Proposed 230 kV OHTL
Existing County Roads
Preliminary Turbine Array Corridor
Project Boundary
1,320 ft Resident Setbacks
0
0.25
0.5
1
Miles
N
S
E
W
Proposed POI
Western 230 kV OHTL
Proposed Project
Substation (5 acres)
40th St
40th Ave
County Rd 90
42nd St
78th Ave
79th Ave
80th Ave
72nd Ave
73rd Ave

Sunflower Wind
Environmental Assessment
Scoping Meeting
5:00 pm to 8:00 pm
August 22, 2013 – Dickinson, North Dakota

Western AREA POWER ADMINISTRATION

- Please Print -

First	Last	Street/PO Address, City, State, Zip	Email	Organization
Richard	Zimmerman	[redacted]		
Car	Kitzan	[redacted]		
Bill	Hansen	[redacted]		
VERNA	HANSEN	[redacted]		
Maxine	Dolleman	[redacted]		
Jerry & Carol	Kuntz	[redacted]		
Ken & Sharon	Kreun	[redacted]		
Vivian & Roy	Bauer	[redacted]		
Gene-Virginia Veit	Veil	[redacted]		

Sunflower Wind
Environmental Assessment
Scoping Meeting
5:00 pm to 8:00 pm
August 22, 2013 – Dickinson, North Dakota

Western
AREA POWER
ADMINISTRATION

- Please Print -

First	Last	Street/PO Address, City, State, Zip	Email	Organization
Clyde	Wanner	[redacted]	[redacted]	[redacted]
David	Opp	[redacted]	[redacted]	[redacted]
Duane	Opp	[redacted]	[redacted]	[redacted]
Greig	Schneider	[redacted]	[redacted]	[redacted]
Rick	Anhelut	[redacted]	[redacted]	[redacted]
Roy	Schneider	[redacted]	[redacted]	[redacted]
George	Saxowsky	[redacted]	[redacted]	
John	Langer	[redacted]	[redacted]	

Department of Energy
Western Area Power Administration
Upper Great Plains Customer Service Region
P.O. Box 35800
Billings, MT 59107-5800

OCT 0 8 2013

B0403.BL

The Honorable Dave Archambault II
Chairman
Standing Rock Sioux Tribe
P.O. Box D
Fort Yates, ND 58538

Dear Chairman Archambault:

Western Area Power Administration (Western), a power-marketing agency of the Department of Energy, has received an interconnection request from Sunflower Wind Project, LLC (SWP), a subsidiary of Infinity Wind Power, for a proposed 80-megawatt wind generating facility in Morton and Stark Counties, North Dakota. The facility is to be located three miles south of the town of Hebron and would connect to Western's existing Bismarck to Medora 230-kV Transmission Line.

The purpose of this letter is to inform you of the proposed project, provide notice that Western will prepare an Environmental Assessment, initiate government-to-government consultation, and invite your participation in the environmental review. The information presented here includes a brief project description and an enclosed map. Additional information will continue to be provided to you and designated tribal departments or staff as it becomes available.

The area under control by SWP is approximately 9,000 acres (ac) (3,642 hectares [ha]) of largely agricultural land, although sections of grassland/pasture lands are within the project area. The proposed project would include construction and operation of between 30 and 50 wind turbine generators for a total project output of up to 80 megawatts. The Area of Potential Effect (APE) would include any area of physical ground disturbance caused by, but not limited to, the construction of collector lines and access roads, an associated substation, a one mile long 230-kV overhead transmission line, an operations and maintenance building, temporary staging areas, and a permanent meteorological tower. The wind turbine hub height, the extent of turbine pad footprint, and the total height at the rotor apex has not yet been identified and would depend on the type and size of turbine purchased for the project; however, a typical rotor apex height would be between 350 ft. (107 m) and 450 ft. (137 m). A visual APE of no less than one mile around the project footprint is anticipated for this project.

It is our understanding that there may be important cultural resources and/or places with traditional cultural significance for your Tribe within the area that may be impacted by the project. Western would appreciate your assistance in identifying these properties.

For questions or information related to the project, please contact Lou Hanebury, Western's Upper Great Plains (UGP) Environmental Protection Specialist at 406-255-2812 or Dave Kluth, UGP Regional Preservation Officer at 605-353-2519. Lou's e-mail is hanebury@wapa.gov and Dave's e-mail is kluth@wapa.gov .

I look forward to working with you as this process moves forward.

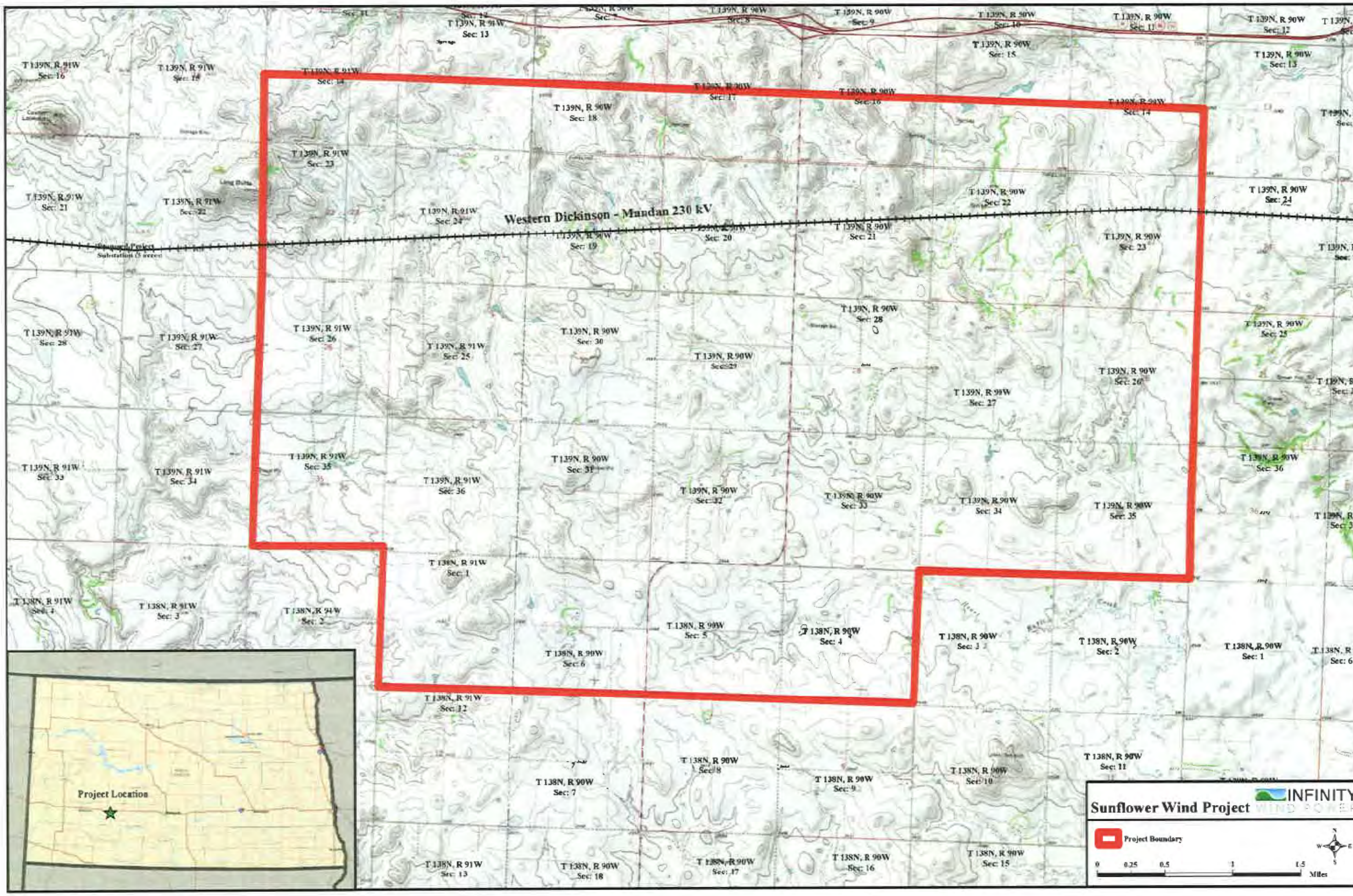
Sincerely,

Nicholas J. Stas

Nicholas J. Stas
Environmental Manager

Enclosure:
Map of Sunflower Wind Project, Morton and Stark Counties, ND

cc:
Ms. Waste'Win Young, THPO, Standing Rock Sioux Tribe



Sunflower Wind Project
INFINITY WIND POWER
Project Boundary
Miles
Project Location
Western Dickinson - Mandan 230 kV
T 139N, R 90W Sec: 18
T 139N, R 90W Sec: 30
T 139N, R 90W Sec: 27
T 139N, R 90W Sec: 34
T 138N, R 90W Sec: 5
T 138N, R 90W Sec: 6
T 138N, R 90W Sec: 7
T 139N, R 91W Sec: 26
T 139N, R 91W Sec: 36
T 138N, R 91W Sec: 1

Ms. Dianne Derosiers, THPO
Sisseton-Wahpeton Oyate
P.O. Box 907
Sisseton, SD 57262

The Honorable Robert Shepherd
Chairman
Sisseton-Wahpeton Dakota Nation
P.O. Box 509
Agency Village, SD 57262

Mr. Russell Eagle Bear, THPO
Rosebud Sioux Tribe
P.O. Box 809
Rosebud, SD 57570

Mr. Cyril Scott, President
Rosebud Sioux Tribal Council
P.O. Box 430
Rosebud, SD 57570

Mr. Steve Vance, THPO
Cheyenne River Sioux Tribe
P.O. Box 590
Eagle Butte, SD 57625

Mr. Kevin Keckler, Sr., Chairman
Cheyenne River Sioux Tribe
P.O. Box 590
Eagle Butte, SD 57625

Ms. Waste'Win Young, THPO
Standing Rock Sioux Tribe
P.O. Box D
Fort Yates, ND 58538

Mr. Dave Archambault II, Chairman
Standing Rock Sioux Tribe
P.O. Box D
Fort Yates, ND 58538

Mr. Curley Youpee, THPO
Ft. Peck Tribes
P.O. Box 1027
Poplar, MT 59255

Mr. Floyd G. Azure, Chairman
Ft. Peck Tribes
P.O. Box 1027
Poplar, MT 59255

Mr. Elgin Crows Breast, THPO
Three Affiliated Tribes
404 Frontage Road
New Town, ND 58763

Mr. Tex Hall, Chairman
Three Affiliated Tribes Business Council
404 Frontage Road
New Town, ND 58763

Mr. Richard Thomas, THPO
Santee Sioux Nation
108 Spirit Lake Avenue West
Niobrara, NE 68760

Mr. Roger Trudell, Chairman
Santee Sioux Nation
108 Spirit Lake Avenue West
Niobrara, NE 68760

Ms. Lana Gravatt, THPO
Yankton Sioux Tribe
P.O. Box 1153
Wagner, SD 57380

Mr. Thurman Cournoyer, SR.
Chairman
Yankton Sioux Tribe
PO Box 1153
Wagner, SD 57380

Ms. Wanda Wells, THPO
Crow Creek Tribe
P.O. Box 50
Fort Thompson, SD 57339

Mr. Brandon Sazue, Sr., Chairman
Crow Creek Tribe
P.O. Box 50
Fort Thompson, SD 57339

Ms. Claire Green, THPO
Lower Brule Sioux Tribe
P.O. Box 187
Lower Brule, SD 57548

Mr. Michael Jandreau, Chairman
Lower Brule Sioux Tribe
P.O. Box 187
Lower Brule, SD 57548

Mr. Willmar Mesteth, THPO
Oglala Sioux Tribe
P.O. Box 419
Pine Ridge, SD 57770

Mr. Bryan V. Brewer, Chairman
Oglala Sioux Tribe
P.O. Box 2070
Pine Ridge, SD 57770

Appendix B
Agency Correspondence and Public Comments

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Appendix B Contents

- Request for Comment Letters Sent
    - Chase Airport
    - Morton County Emergency Services
    - Morton County Sheriff
    - Stark County Emergency Services
    - Stark County Sheriff
- Agency Comments and Correspondence
    - Natural Resources Conservation Service
    - North Dakota Game and Fish Department
    - North Dakota Aeronautics Commission
    - U.S. Fish and Wildlife Service
    - North Dakota Regulatory Office
- Public Comments
    - Undeliverable letters
    - Roxy comment email
    - Tim Schlenvogt comment email
    - Comment cards from open house meeting

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INFINITY
WIND POWER

October 23, 2013

Mr. Keith Chase
P.O. Box 48
Hebron, ND 58638

RE: Notification of the Sunflower Wind Project – Morton and Stark Counties

Dear Mr. Chase:

I'm contacting you today to notify you of a wind energy project that my company is developing in proximity to the airstrip you manage near Hebron. Infinity Wind Power (Infinity) is developing the Sunflower Wind Project approximately 4 miles to the south of Hebron and 6 miles to the west of Glen Ullin. The project will consist of up to 65 wind turbines with tip heights of up to 442 feet.

We recently contacted the North Dakota Aeronautics Commission to obtain information related to airstrips that are in proximity to the project area. The database from the Aeronautics Commission identified your airstrip to the northeast of Hebron. The attached map shows the project boundary in proximity to your airstrip. Infinity has submitted obstruction evaluation requests to the Federal Aviation Administration (FAA). The FAA issued determinations of no hazard for the Project.

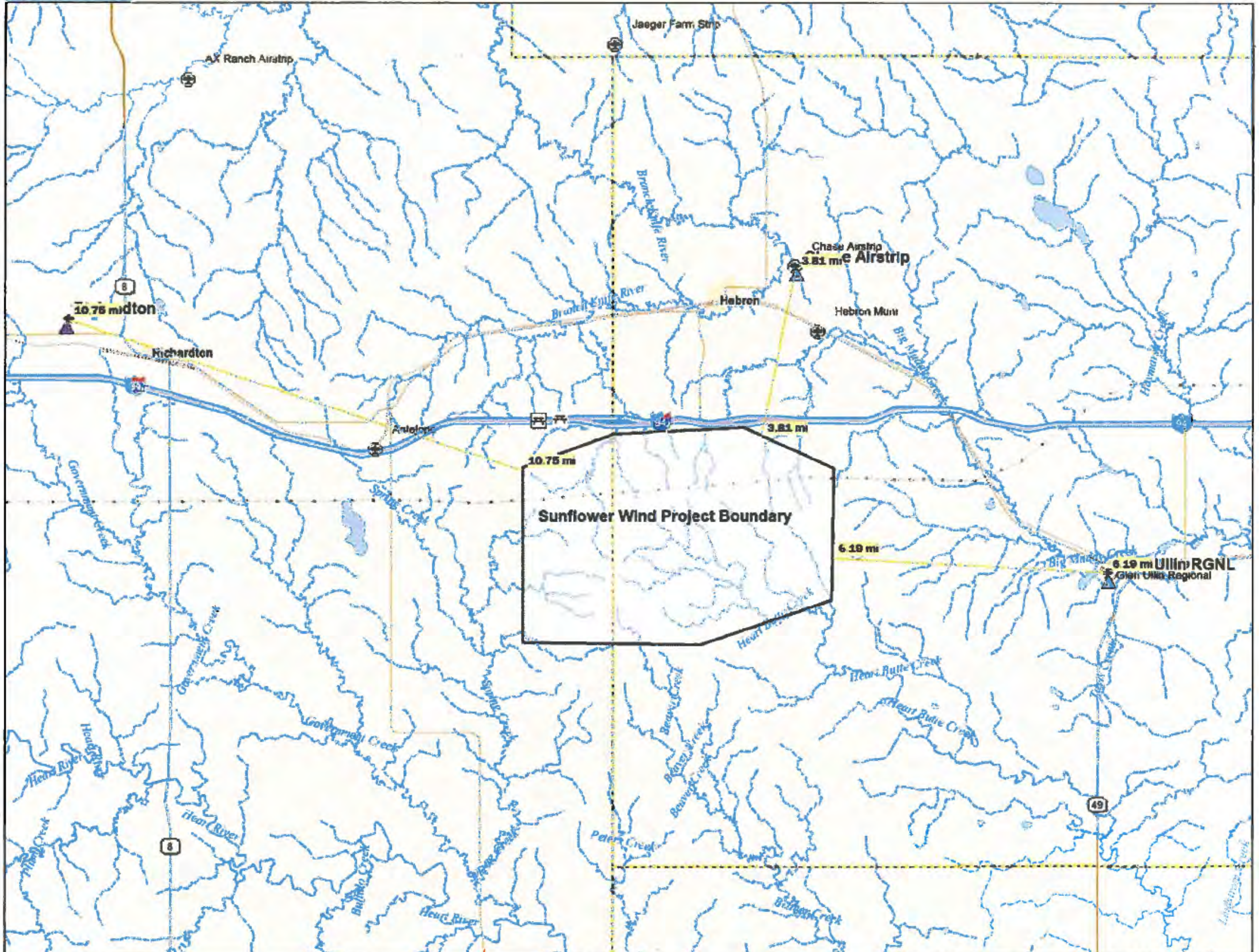
If you have any questions or concerns related to the Sunflower Wind Project, I can be reached at 805-569-6185 or via email at cwillis@infinitywind.com

Thanks,

Casey Willis
Senior Project Manager

DeLORME

XMap® 7



INFINITY
WIND POWER

October 23, 2013

Mr. Tom Doering
Morton County Emergency Manager
210 2nd Avenue NW
Mandan, ND 58554

RE: Request for Comments on a Proposed Wind Project
Sunflower Wind Project – Morton and Stark Counties

Dear Mr. Doering:

Infinity Wind Power (Infinity) is developing the Sunflower Wind Project, which is located approximately 4 miles to the south of Hebron and 6 miles to the west of Glen Ullin. The Project is located in both Stark and Morton Counties (see enclosed map). The project will consist of up to 65 wind turbines with tip heights of up to 442 feet. In addition to the wind turbines, the project would also include underground electrical collection lines, a project substation, operations and maintenance yard, and a permanent meteorological monitoring tower. The project will require permits to be issued from Morton County, Stark County, and the North Dakota Public Services Commission amongst other agencies. We anticipate filing applications for permits for the project in early 2014. Under our current schedule, construction would commence in early 2015 with a commercial operation date toward the end of 2015.

The purpose of this letter is to request comments from your department related to the Project. The information provided by your department will be utilized in the siting of project components. If possible, I would appreciate it if you could provide any feedback regarding the project and any recommendations that you may have by December 1, 2013.

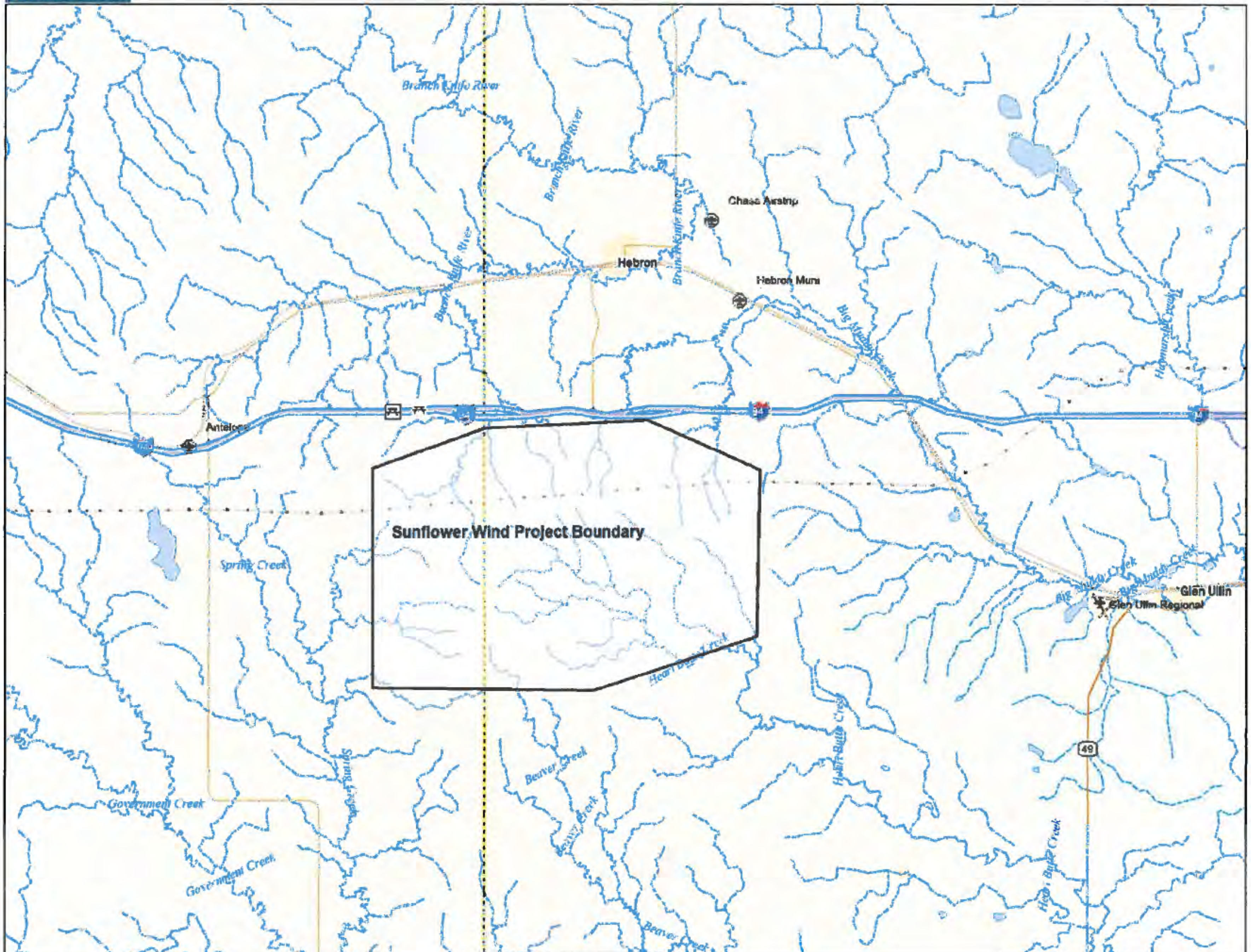
If you have any questions or concerns related to this correspondence, I can be reached at 805-569-6185 or via email at cwillis@infinitywind.com

Thanks,

Casey Willis
Senior Project Manager

DeLORME

XMap® 7



Scale 1 : 150,000

1" = 2.37 mi Data Zoom 10-4

INFINITY
WIND POWER

October 23, 2013

Sheriff Dave Shipman
Morton County Sheriff
205 1st Avenue NW
Mandan, ND 58554

RE: Request for Comments on a Proposed Wind Project
Sunflower Wind Project – Morton and Stark Counties

Dear Sheriff Shipman:

Infinity Wind Power (Infinity) is developing the Sunflower Wind Project, which is located approximately 4 miles to the south of Hebron and 6 miles to the west of Glen Ullin. The Project is located in both Stark and Morton Counties (see enclosed map). The project will consist of up to 65 wind turbines with tip heights of up to 442 feet. In addition to the wind turbines, the project would also include underground electrical collection lines, a project substation, operations and maintenance yard, and a permanent meteorological monitoring tower. The project will require permits to be issued from Morton County, Stark County, and the North Dakota Public Services Commission amongst other agencies. We anticipate filing applications for permits for the project in early 2014. Under our current schedule, construction would commence in early 2015 with a commercial operation date toward the end of 2015.

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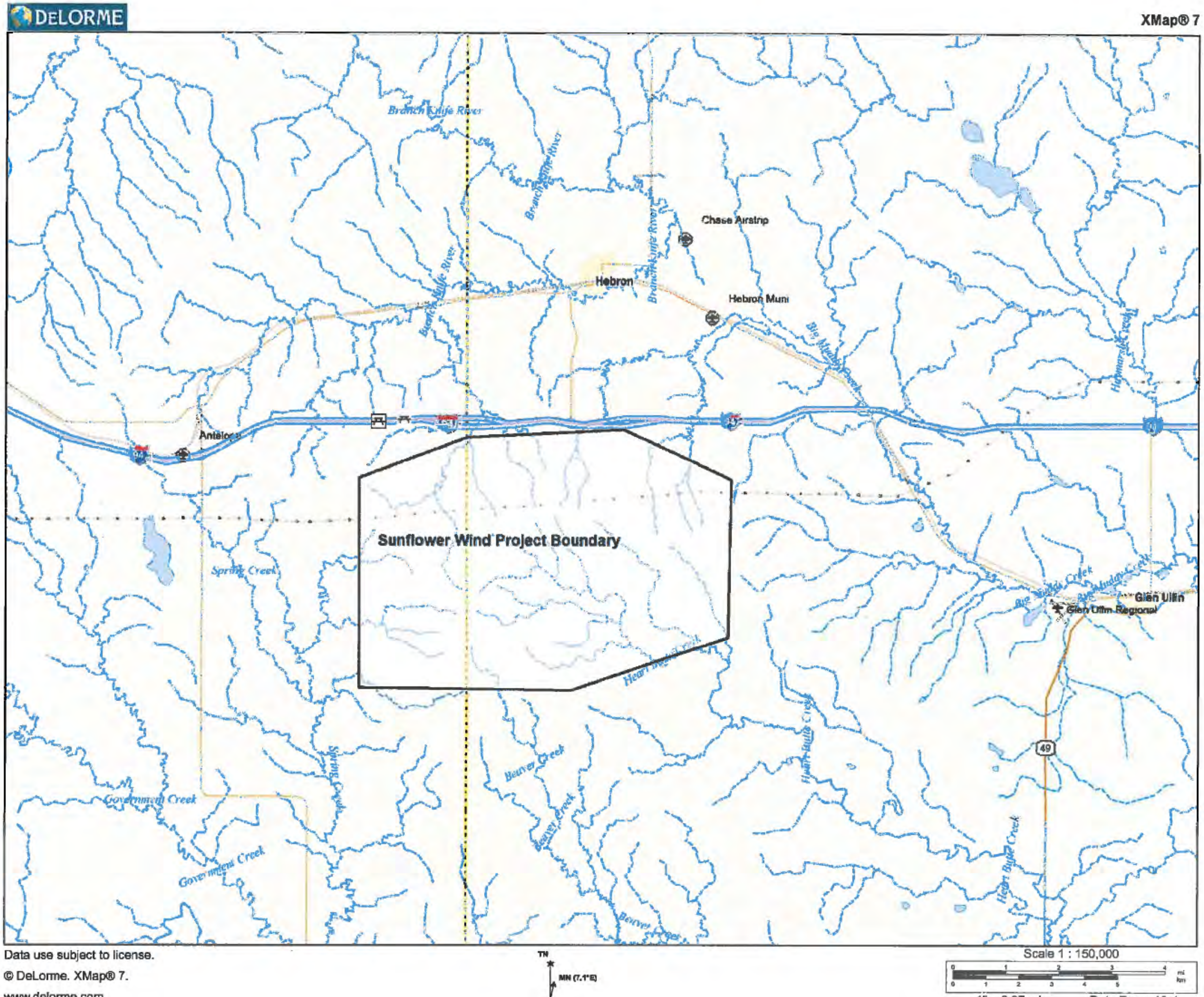
Thanks,

Casey Willis
Senior Project Manager



Data use subject to license.

INFINITY
WIND POWER

October 23, 2013

Mr. Bill Fahlsing
Stark County Department of Emergency Services
66 Museum Drive West
Dickinson, ND 58601

RE: Request for Comments on a Proposed Wind Project
Sunflower Wind Project – Morton and Stark Counties

Dear Mr. Fahlsing:

Infinity Wind Power (Infinity) is developing the Sunflower Wind Project, which is located approximately 4 miles to the south of Hebron and 6 miles to the west of Glen Ullin. The Project is located in both Stark and Morton Counties (see enclosed map). The project will consist of up to 65 wind turbines with tip heights of up to 442 feet. In addition to the wind turbines, the project would also include underground electrical collection lines, a project substation, operations and maintenance yard, and a permanent meteorological monitoring tower. The project will require permits to be issued from Morton County, Stark County, and the North Dakota Public Services Commission amongst other agencies. We anticipate filing applications for permits for the project in early 2014. Under our current schedule, construction would commence in early 2015 with a commercial operation date toward the end of 2015.

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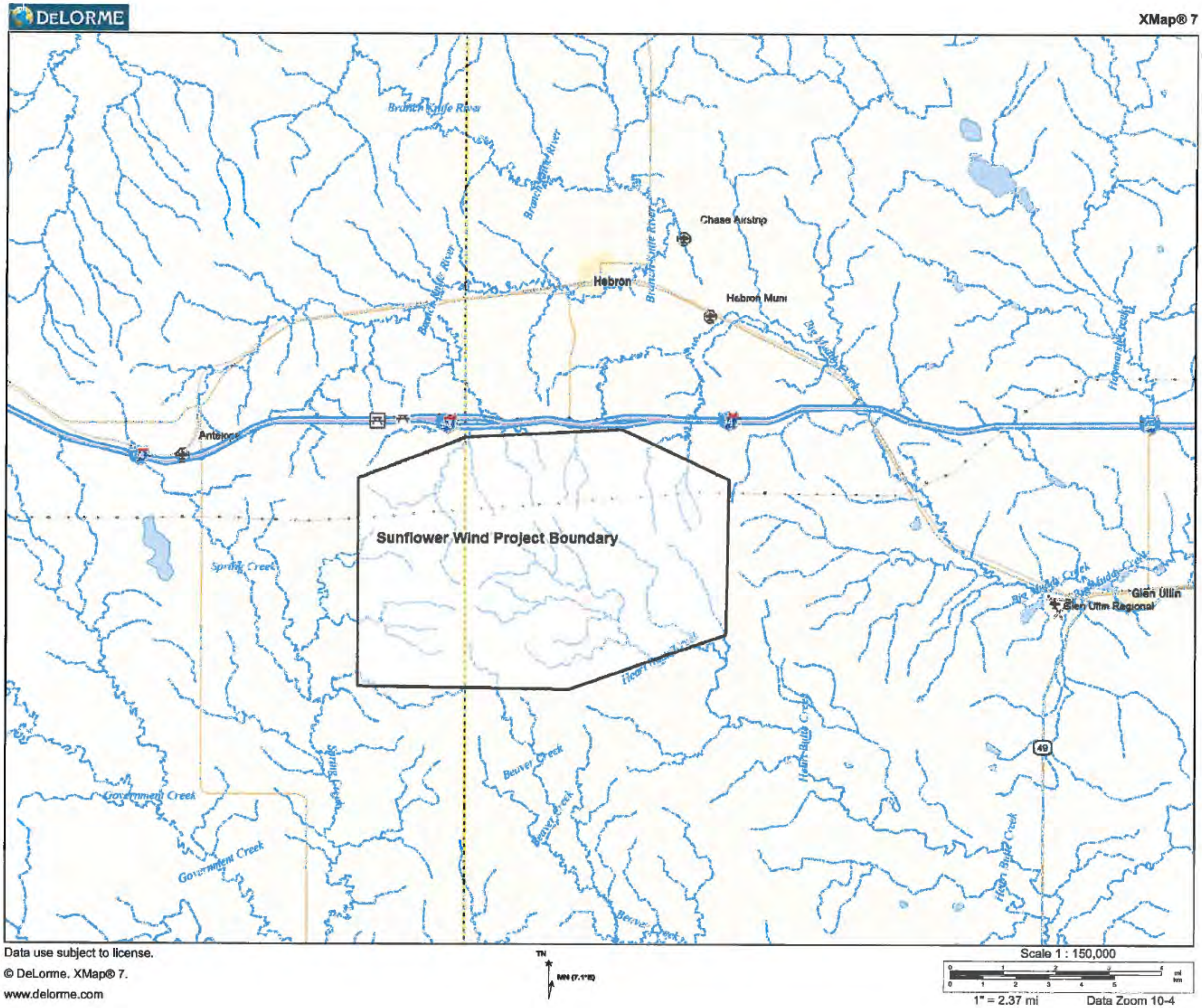
If you have any questions or concerns related to this correspondence, I can be reached at 805-569-6185 or via email at cwillis@infinitywind.com

Thanks,

Casey Willis
Senior Project Manager


DELORME
XMap® 7
Branch Knife River
Chase Airstrip
Hebron
Hebron Muni
Antelope
Sunflower Wind Project Boundary
Spring Creek
Glen Ullin
Glen Ullin Regional
Big Muddy Creek
Beaver Creek
Heart Butte Creek
Government Creek
49
TN
MN (7.1°E)
Scale 1 : 150,000
1" = 2.37 mi
Data Zoom 10-4

INFINITY
WIND POWER

October 23, 2013

Sheriff Clarence Tuhy
PO Box 130
Dickinson, ND 58601

RE: Request for Comments on a Proposed Wind Project
Sunflower Wind Project – Morton and Stark Counties

Dear Sheriff Thuy:

Infinity Wind Power (Infinity) is developing the Sunflower Wind Project, which is located approximately 4 miles to the south of Hebron and 6 miles to the west of Glen Ullin. The Project is located in both Stark and Morton Counties (see enclosed map). The project will consist of up to 65 wind turbines with tip heights of up to 442 feet. In addition to the wind turbines, the project would also include underground electrical collection lines, a project substation, operations and maintenance yard, and a permanent meteorological monitoring tower. The project will require permits to be issued from Morton County, Stark County, and the North Dakota Public Services Commission amongst other agencies. We anticipate filing applications for permits for the project in early 2014. Under our current schedule, construction would commence in early 2015 with a commercial operation date toward the end of 2015.

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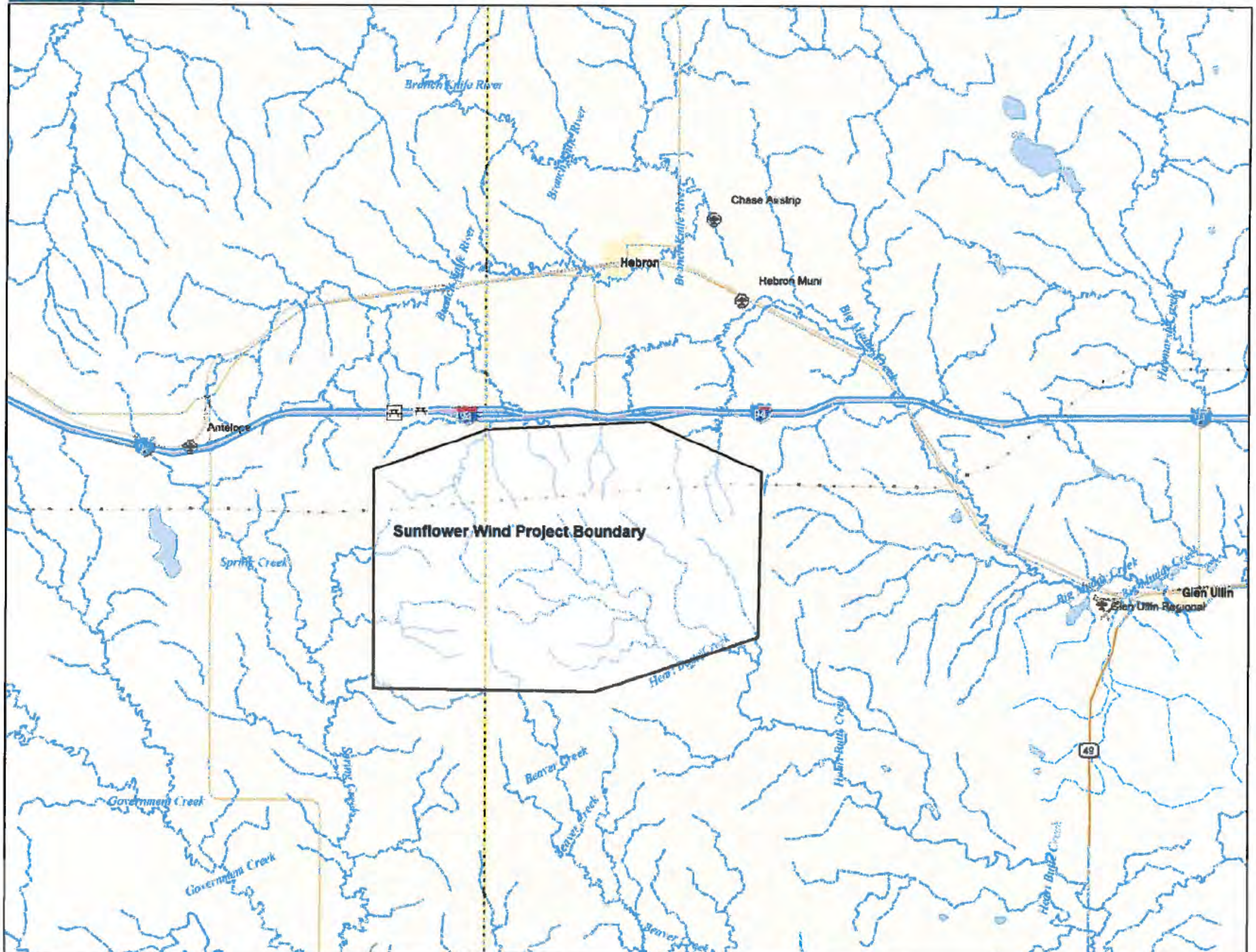
If you have any questions or concerns related to this correspondence, I can be reached at 805-569-6185 or via email at cwillis@infinitywind.com

Thanks,

Casey Willis
Senior Project Manager

DELORME

XMap® 7



Scale 1 : 150,000

1" = 2.37 mi

Data Zoom 10-4

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
1301 Business Loop East Suite 1
Jamestown, ND 58401

September 30, 2013

Lou Hanebury, EPS
DOE/Western Area Power Administration
Upper Great Plains Customer Service Region
P.O. Box 35800
Billings, MT 59107-5800

RE: Sunflower Wind Project Morton and Stark Counties, North Dakota

Dear Mr. Hanebury,

Jim Hopfauf, the Soil Conservation District Supervisor of Morton County in Mandan, ND contacted me about your office requesting comments about issues related to the Sunflower Wind Project Area in Morton and Stark Counties, North Dakota and how the development may affect land use and applicable permits that maybe required from his office. I received your letter today and although the comment period has closed I feel it is beneficial that I comment regarding the above named project. Information regarding Conservation Reserve Program properties in the project areas can be obtained by contacting Linda Urlacher, County Executive Director, Morton County Farm Service Agency, 2540 Overlook Ln., Mandan, ND 58554 for Morton County and Pete Solemsaas, County Executive Director, Stark County Farm Service Agency, 2493 4th Ave W Room B., Dickinson, ND 58601-2623 for Stark County. The Natural Resources Conservation Service (NRCS) concerns are in regards to prime farmlands, wetlands, and soil erosion in Morton and Stark Counties. NRCS policy regarding prime farmlands and wetlands is as follows.

Farmland Protection Policy Act (FPPA) – NRCS has a major responsibility with FPPA in documenting conversion of farmland (i.e., prime, statewide, and local importance) to non-agricultural use. If your proposed project does not include any federal funds FPPA does not apply; therefore, no further action is needed. If your project is supported by federal funds, FPPA may apply under certain circumstances. New transmission towers may remove farmland from production; therefore, these sites may be subject to FPPA, and an AD-106 must be completed. You may utilize a fillable web based form at http://www.nrcs.usda.gov/Programs/fppa/pdf_files/AD106.PDF to record the following. Please complete Part I and Part III for those areas affected by FPPA and return to me. Activities such as installing overhead power lines, substations, a switching yard and wind turbines etc., will enact FPPA, and the form AD-1006 must be completed. If your project has progressed to the point where permanent sites have been selected, please follow the instructions in the next paragraph. A fill-able, web based form Farmland Conversion Impact Rating Form AD-1006 is available at http://www.nrcs.usda.gov/Programs/fppa/pdf_files/AD1006.PDF to record the following information. Please complete Part I and Part III and return to me. I will also need a map of the sites at an appropriate scale so I can accurately assess the area (e.g., 1:20,000 or 1:24,000).

If the farmland (i.e., prime, statewide, and local importance) is determined to be subject to the FPPA, I will then complete Parts II and IV.

NRCS will measure the relative value of the site as farmland on a scale of 0 to 100, according to the information sources listed in CFR 658.5(a). If FPPA applies to this site, Form AD- 1006 will be returned to your agency for completion of Part VI, Site Assessment Criteria.

For the past year, NRCS has been monitoring Farmland Conversion Impact Ratings (Form AD-1006 and Form AD-106). Over this period of time, we have become concerned with how the forms are being completed, particularly Part IV – Site Assessment Criteria, which is consistently being scored below 60 points.

As a general rule, if FPPA applies and the site is in agricultural production, rarely would it be appropriate for it to have a score of less than 60 points. According to CFR 658.4(g), your agency is requested to return a copy of the Form AD-1006, which Page 2 indicates, the final decision, to NRCS so we can meet our reporting requirements and for data collection process.

Wetlands - The Wetland Conservation Provisions of the 1985 Food Security Act, as amended, provide that if a USDA participant converts a wetland for the purpose of, or to have the effect of, making agricultural production possible, loss of USDA benefits could occur.

NRCS has developed the following guidelines for the installation of permanent structures where wetlands occur. If these guidelines are followed, the impacts to the wetland(s) will be considered minimal allowing USDA participants to continue to receive USDA benefits. Following are the requirements:

- Disturbance to the wetland(s) must be temporary,
- no drainage of the wetland(s) is allowed (temporary or permanent),
- mechanized landscaping necessary for installation is kept to a minimum and preconstruction contours are maintained,
- temporary side cast material must be placed in such a manner not to be dispersed in the wetland, and
- all trenches must be backfilled to the original wetland bottom elevation.

NRCS would recommend that impacts to wetland(s) be avoided. If the alignment of the permanent structure requires construction in a wetland, NRCS can complete a certified wetland determination, if requested by the landowner/operator. In addition, care should be taken during the construction of the proposed project to minimize soil blowing and water erosion as these may cause negative impacts to adjacent farmlands.

If you have additional questions pertaining to FPPA, please contact me, at (701) 252-1460 EXT 115

Sincerely

FREDERICK P. AZIZ
Area Resource Soil Scientist

Cc:
Michele Doyle, DC, NRCS, Mandan, ND
Steven J. Sieler, SSL, NRCS, Bismarck, ND

"VARIETY IN HUNTING AND FISHING"

NORTH DAKOTA GAME AND FISH DEPARTMENT

100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58501-5095 PHONE 701-328-6300 FAX 701-328-6352

September 19, 2013

Lou Hanebury
Environmental Protection Specialist
Western Area Power Administration
Upper Great Plains Customer Service Region
PO Box 35800
Billings, MT 59107-5800

Dear Mr. Hanebury:

RE: Sunflower Wind Project

The North Dakota Game and Fish Department has reviewed this project for wildlife concerns. Our primary concern with wind power development is the disturbance of native prairie associated with construction of turbines, access roads, and other associated facilities. We ask that work within native prairie be avoided to the extent possible. This could include micro-siting turbines onto adjacent previously disturbed land, locating access roads on existing section line trails rather than across undisturbed native prairie, etc.

The National Wetland Inventory indicates various wetlands located within the proposed project area. We recommend that any unavoidable wetland impacts be replaced in kind, above-ground appurtenances not be placed in wetland areas, and no alterations be made to existing drainage patterns.

We recommend that collection lines be buried whenever possible, and any necessary overhead lines be marked when placed over perennial streams or sited in close proximity to wetland complexes to minimize possible avian impacts. The publication "Mitigating Bird Collisions with Power Lines: the State of the Art in 1994" provides a range of management options which can be used to reduce avian collisions.

We also recommend that routine monitoring for avian and bat mortality be included as part of the facility maintenance plan for the life of the project. We would appreciate being kept informed as this project progresses, and if possible, we would like the GPS coordinates for each turbine after the site has been established.

Sincerely,

Greg Link
Chief
Conservation & Communication Division

js

Kruger, Thomas

From: Wanner, Kyle C. <kcwanner@nd.gov>
Sent: Wednesday, October 23, 2013 12:27 PM
To: Casey Willis
Cc: Taborsky, Lawrence E.
Subject: RE: Private Airstrips Database
Attachments: Antelope Hills Map Airports in Vicinity.pdf; Sunflower Map Airports in Vicinity.pdf; Antelope Hills Map All Airports.pdf; Sunflower Map All Airports.pdf

Casey,

These maps are a great help in showing where the private/public airports are in relation to the project boundaries. I would recommend sending the project map/comment information to the airport contacts listed to be in the area shown. This will assure that you get the proper timely feedback that you would like to receive and would give the airports the opportunity to comment if they feel it is necessary. Looking at the locations, I would think that there would be no conflicts, but if you are able to do the due diligence of asking the airports and requesting comments ahead of time, then you have done the best you can and can inform the ND PSC that the airports have been contacted and that there are no issues.

Thanks,

Kyle Wanner, Airport Planner
North Dakota Aeronautics Commission
w (701) 328-9651
c (701) 425-5926
http://www.nd.gov/ndaero/

From: Casey Willis [mailto:cwillis@infinitywind.com]
Sent: Wednesday, October 23, 2013 11:28 AM
To: Wanner, Kyle C.
Subject: RE: Private Airstrips Database

Kyle, take a look at the attached maps. I plotted the location of all of the airports that were within about 10 miles of each of our two projects. I previously stated incorrectly that all of the airstrips were farther than six miles from our site. There are a couple small private airstrips that are about 3-4 miles from the project boundary. This doesn't necessarily represent, where the turbines would be placed, so it's more conservative in that regard.

Would you recommend that we reach out to the contacts listed?

Casey

From: Wanner, Kyle C. [mailto:kcwanner@nd.gov]
Sent: Tuesday, October 22, 2013 10:34 AM

To: Casey Willis
Subject: RE: Private Airstrips Database

Casey,

The ND reviews wind project boundary areas and ensures that the project will not conflict with any of our public airports. We provide comments when we feel that the project could have a negative impact on one of our public airports. I would encourage you to identify the registered private use airports by utilizing the FAA database that may be affected by the project and work with problems and solutions with the private airstrip owners on a local level.

As you have stated – if there is no affect to public airports and the project area is approximately 6 miles from any private airstrips than it is reasonable to say you should not have a conflict.

Kyle Wanner, Airport Planner
North Dakota Aeronautics Commission
w (701) 328-9651
c (701) 425-5926
http://www.nd.gov/ndaero/

From: Casey Willis [mailto:cwillis@infinitywind.com]
Sent: Tuesday, October 22, 2013 12:15 PM
To: Wanner, Kyle C.
Subject: RE: Private Airstrips Database

Thanks Kyle. As I indicated in the email to Larry, we submitted 7460s through the FAA and were issued Determinations of No Hazard. I've looked through the database and I'm aware of the private airports that are listed. All are located at least six miles from our project area, so I don't think we are going to have a conflict.

Question for you. Does the ND Aeronautics Commission review wind projects and determine whether there will or will not be conflicts with airports in the vicinity? The ND PSC is apparently sensitive to this issue, so I'm just trying to figure out if I need to send you a project boundary and request a response letter? Or if there's another method that I should use to put this issue to rest?

Let me know your thoughts on this.

Casey

From: Wanner, Kyle C. [mailto:kcwanner@nd.gov]
Sent: Tuesday, October 22, 2013 6:03 AM
To: Casey Willis
Cc: Taborsky, Lawrence E.
Subject: RE: Private Airstrips Database

Casey,

The database that we currently utilize to track existing registered private airstrips is maintained by the FAA as the FAA is the entity that certifies private airstrips. The database can be found at:

http://www.faa.gov/airports/airport_safety/airportdata_5010/

Hope this helps-

Kyle Wanner, Airport Planner
North Dakota Aeronautics Commission
w (701) 328-9651
c (701) 425-5926
http://www.nd.gov/ndaero/

From: Casey Willis [mailto:cwillis@infinitywind.com]
Sent: Monday, October 21, 2013 5:51 PM
To: Taborsky, Lawrence E.
Subject: Private Airstrips Database

Larry,

Question for you. We have a couple wind energy projects that we are working on developing in North Dakota. They will be required to go through the ND PSC site certificate process. It was recently conveyed to me that the Commissioners have taken an interest in the potential for a project's conflict with existing airports. We have Notices of Determination that were issued by the FAA, but it was suggested that I contact the North Dakota Aeronautics Commission for a list of private airstrips that would not necessarily be screened by the FAA.

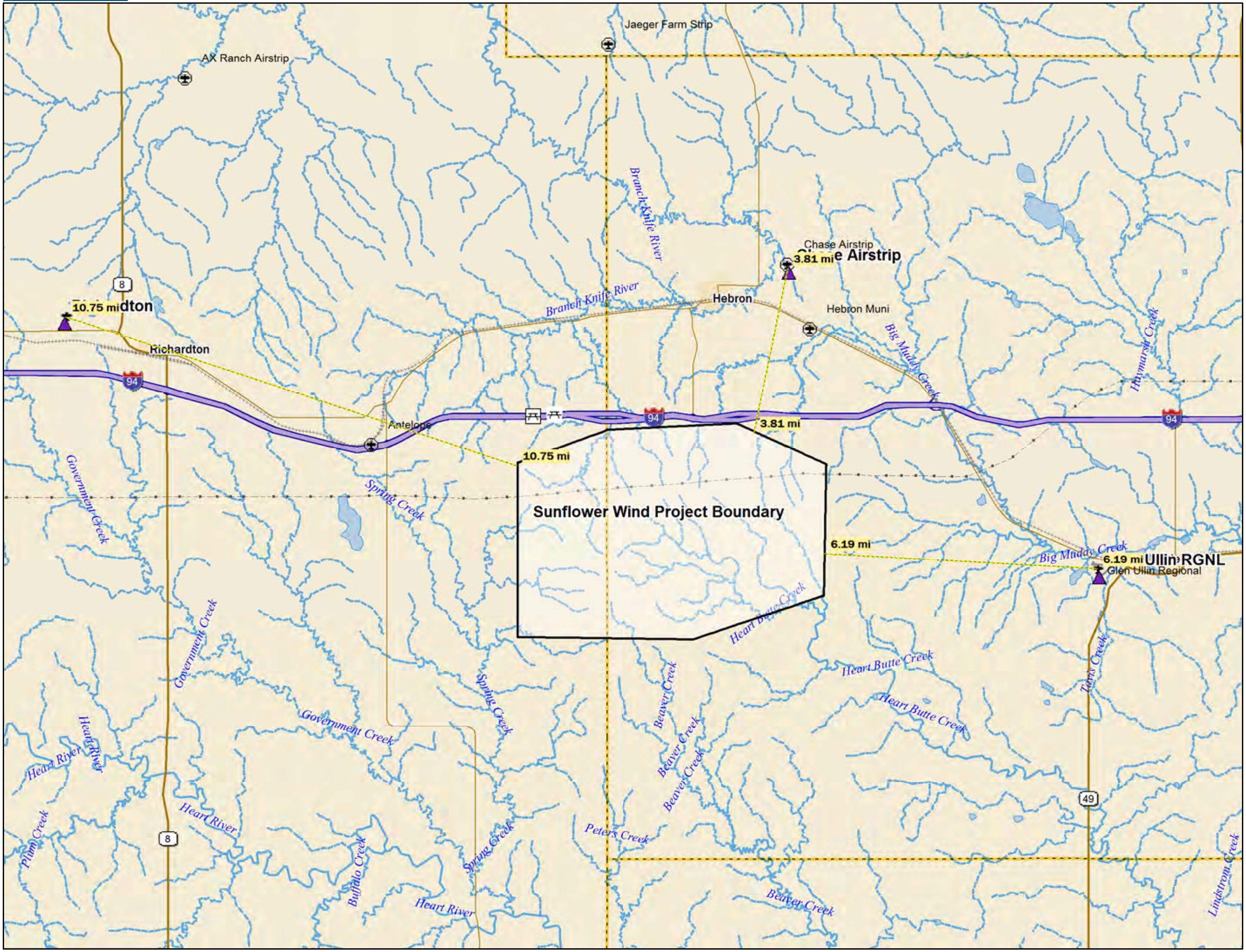
Does the ND Aeronautics Commission maintain a database on existing private airstrips? If so, how would I go about requesting a list in proximity to our project sites?

Thanks,
Casey

Infinity Wind Power
3760 State St., Suite 102 | Santa Barbara, CA 93105
O 805.569 6185 | M 805.701.1979 | F 805.569.6190

DELORME

XMap® 7



TN

MN (7.1°E)

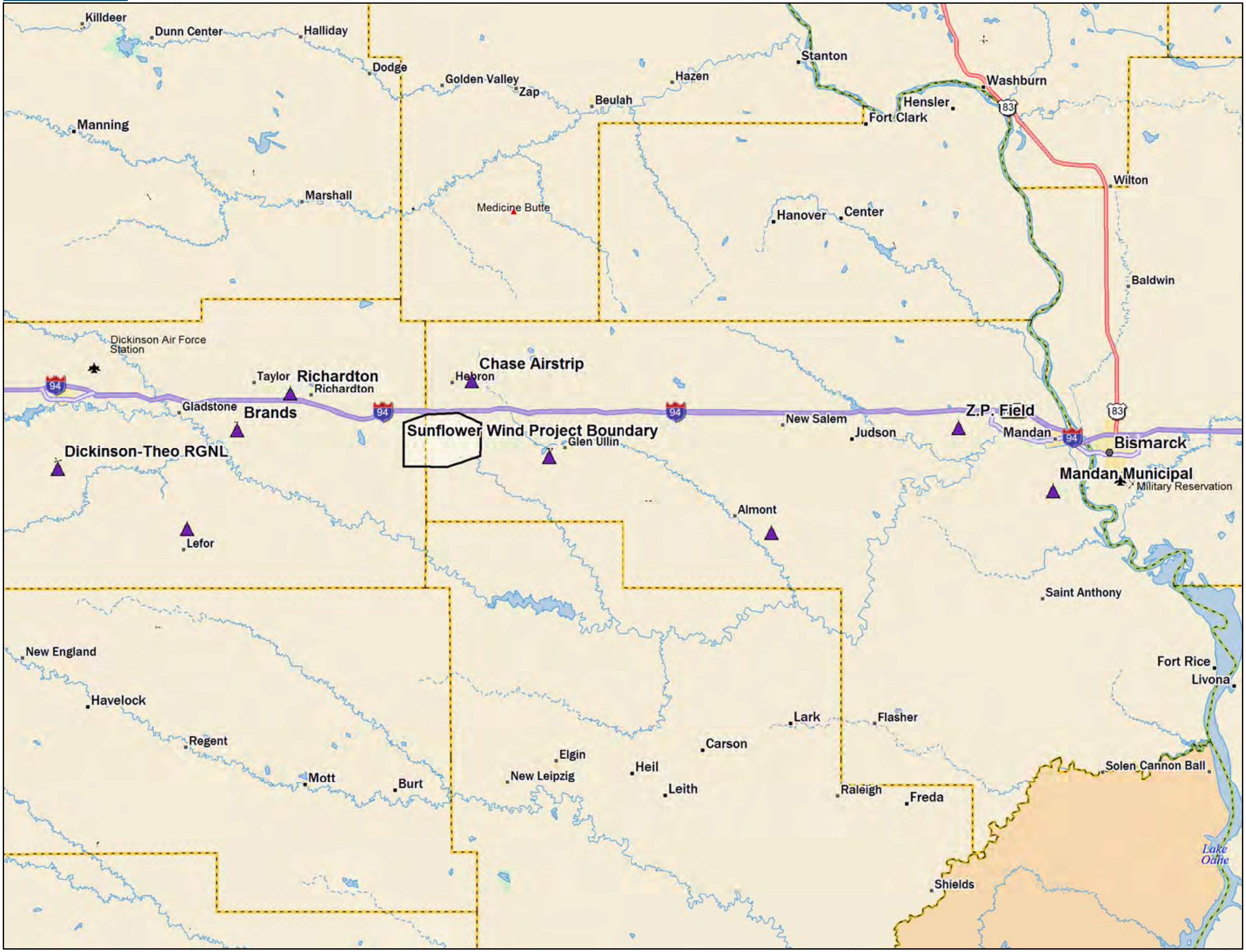
Scale 1 : 187,500

1" = 2.96 mi

Data Zoom 10-1

DeLorme

XMap® 7



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TN

MN (6.8°E)

Scale 1 : 750,000

1" = 11.84 mi

Data Zoom 8-1

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

DEC 2 0 2013

Lou Hanebury
Western Area Power Administration
Upper Great Plains Customer Service Region
P.O. Box 35800
Billings, Montana 59107-5800

Re: Scoping comments on Sunflower Wind Project Environmental Assessment. In reply please reference TAILS # 2013-CPA-0234

Dear Mr. Hanebury:

This is in response to your letter dated August 05, 2013, regarding environmental information in relation to public scoping for the preparation of an Environmental Assessment (EA) for the proposed Sunflower Wind Project (Project). The proposed project, an 80 megawatt (MW) wind energy facility located in Morton and Stark Counties, North Dakota, would interconnect with Western Area Power Administration's (Western) Western Dickinson to Mandan 230-kV transmission line. Therefore, Western is the lead federal agency for the proposed action. The proposed project would consist of up to 50 wind turbine generators, and underground power collection system a connector road system and an operations and maintenance facility.

The specific project location is:

T. 138 N., R. 90 W., Sections 4-6
T. 138 N., R. 91 W., Section 1
T. 139 N., R. 90 W., Sections 14-23, and 26-35
T. 139 N., R. 91 W., Sections 13, 14, 23-26, 35, and 36

The U.S. Fish and Wildlife Service (Service) offers the following comments under the authority of and in accordance with the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 *et seq.*), Executive Order (E.O.) 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds," the Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*), the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), E.O. 11990 "Protection of Wetlands," Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661-667e, as amended), the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), the National Environmental Policy Act (NEPA) (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended), and E.O. 13604 "Improving Performance of Federal Permitting and Review of Infrastructure Projects."

Among other things, E.O. 13604 specifies that federal permitting and review processes must recognize the critical role project sponsors play in assuring the timely and cost-effective review of projects by providing complete information and analysis. It also requires that projects be designed appropriately to avoid, to the extent practicable, adverse impacts on the environment, and to minimize or mitigate impacts that may occur.

Threatened, Endangered and Candidate Species

To obtain information on Service trust resources including federally threatened, endangered and candidate species and designated critical habitat that may occur in the identified areas, or may be affected by the proposed activities, we recommend you access the North Dakota Ecological Services Field Office website at http://www.fws.gov/northdakotafieldoffice/. You may also access the Service's Information, Planning, and Conservation System (IPaC) website at http://ecos.fws.gov/ipac/.

If a federal agency authorizes, funds, or carries out a proposed action, the responsible federal agency, or its designated agent, is required to evaluate whether the action "may affect" listed species. If the federal agency determines the action "may affect, is likely to adversely affect" listed species, then the federal agency shall request formal section 7 consultation with this office, or work with this office to remove the likely adverse effects before proceeding. If the evaluation shows a "no effect" determination on listed species, further consultation is not necessary.

If a non-federal entity receives federal funding for an activity, or if any federal permit or license is required, the federal agency may designate, in writing, the fund recipient or permit applicant as its agent for purposes of informal section 7 consultation. The funding, permitting, or licensing federal agency is responsible to ensure that its actions comply with the ESA, including obtaining concurrence from the Service for any action that may affect a threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat.

The Aransas Wood Buffalo Population (AWBP) of the endangered whooping crane (*Grus americana*) is the only self-sustaining migratory population of whooping cranes remaining in the wild. Whooping cranes breed in the wetlands of Wood Buffalo National Park in Alberta and the Northwest Territories of northern Canada, and overwinter on the Texas coast. Whooping cranes in the AWBP annually migrate through North Dakota during their spring and fall migrations.

The proposed project lies within a corridor that includes approximately 95 percent of all reported whooping crane sightings in the State. The presence of suitable roosting and feeding habitat for whooping cranes indicate the potential for whooping crane presence in the proposed project area. The Service recommends that if a whooping crane is sighted within 1 mile of the project while it is under construction, that all work cease within one mile of that part of the project and the Service be contacted immediately. In coordination with the Service, work may resume after the bird(s) leave the area. Whooping cranes are unlikely to spend more than a few days in any one spot during migration.

The Service recommends mapping wetlands at the project site within 1 mile of all turbines, identifying potentially suitable whooping crane stopover habitat, and analyzing the potential effects to migrating whooping cranes from loss of use of this habitat for migration stopovers. The interactions of whooping cranes with wind turbines and wind farms are currently not fully known, although it is expected that these large birds with relatively low maneuverability are susceptible to mortality via collisions with turbines. The highest known source of mortality to fledged whooping cranes is from striking power lines. Currently, collisions with power lines have accounted for the death or serious injury of at least 46 whooping cranes since 1956. If power lines will be constructed in association with this project, the Service recommends they be placed underground to avoid collision mortality. If underground construction is not practicable, we recommend installation and maintenance of visual marking devices on all new power lines within one mile of potentially suitable whooping crane stopover habitat and an equal length of existing power line in the whooping crane migration corridor within one mile of potentially suitable whooping crane habitat. If Western believes that take of any listed species in the action area is not likely to occur as a result of the proposed project, and therefore no take authorization is needed, we recommend that this be clearly stated in an analysis of effects for each affected species, and that you share this analysis with the Service.

The Service published a proposed rule to list the northern long-eared bat (*Myotis septentrionalis*) as an endangered species on October 2, 2013. The Service has also determined that critical habitat for the northern long-eared bat is not determinable at this time. The northern long-eared bat has been documented as occurring in North Dakota and could utilize habitats in the project area for feeding, roosting, or during migration. We recommend conducting acoustic and mist net surveys to determine the presence/absence of northern long-eared bats in the proposed project area. Each federal agency shall confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed or destroy or adversely modify proposed critical habitat.

Sprague's pipit (*Anthus spragueii*) was added to the candidate species list in 2010. Candidate species such as the Sprague's pipit are not protected under the ESA. However Sprague's pipit as a migratory bird is still protected under the MBTA. Sprague's pipits require large patches of grassland habitat for breeding, with preferred grass heights between 4-12 in (10-30 cm). The species prefers to breed in well-drained, open grasslands and avoids grasslands with excessive shrubs. They can be found in lightly to heavily grazed areas. They avoid intrusive human features on the landscape, so the impact of a development can be much larger than the actual footprint of the feature. If Sprague's pipit habitat is present within your proposed project area, the Service requests that you document any steps taken to avoid and minimize disturbance of this habitat, and that you share this information with our office.

Migratory Birds

The MBTA prohibits the taking, killing, possession, and transportation, (among other actions) of migratory birds, their eggs, parts, and nests, except when specifically permitted by regulations. While the MBTA has no provision for allowing incidental take, the Service realizes that some birds may be killed during project construction and operation even if all known reasonable and effective measures to protect birds are used. The Service Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and agencies that have taken effective steps to avoid take of migratory birds, and by encouraging others to implement measures to avoid take of migratory birds. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, the Office of Law Enforcement focuses its resources on investigating and prosecuting individuals, companies, and agencies that take migratory birds without identifying and implementing all reasonable, prudent, and effective measures to avoid that take. Individuals, companies, or agencies are encouraged to work closely with Service biologists to identify available protective measures when developing project plans and/or avian protection plans, and to implement those measures prior to/during construction or similar activities.

To the extent practicable, schedule construction for late summer or fall/early winter so as not to disrupt migratory birds during the breeding season, February 1 to July 15. If work is proposed to take place during the breeding season, a qualified biologist could be hired to conduct bird/nest surveys within five days prior to the initiation of construction. If active nests are identified, the project proponent should cease construction, maintain a sufficient buffer around active nests to avoid disturbing breeding activities and contact the Service immediately. The Service recommends that Sunflower implement all practicable measures to avoid all take, such as suspending construction where necessary, and/or maintaining adequate buffers to protect the birds until the young have fledged. The Service further recommends that if you choose to conduct field surveys for nesting birds with the intent of avoiding take, that you maintain any documentation of the presence of migratory birds, eggs, and active nests, along with information regarding the qualifications of the biologist(s) performing the survey(s), and any avoidance measures implemented at the project site. Should surveys or other available information indicate a potential for take of migratory birds, their eggs, or active nests, the Service requests that you contact this office for further coordination on the extent of the impact and the long-term implications of the intended use of the project on migratory bird populations.

Our GIS analysis of the proposed project area shows a number of wetlands and native prairie areas. These habitat types provide important ecological services, including nesting and foraging habitat for migratory birds. Wetlands take at least two to three years for the vegetation to return, and at least this long for full functionality to be recovered. Native prairie can take a decade or more to recover, and even then, the replanted area is not as diverse as the original habitat. Additionally, non-natives which become established when the project area is disturbed may spread into the adjacent prairie.

To help ameliorate these impacts, the Service suggests that Sunflower develop a conservation plan for migratory birds to compensate for the impacts associated with the construction, operation, and maintenance of the proposed project. We recommend that the conservation plan include the following: an analysis of the type and acreage of each habitat impacted; a discussion of how impacts on native habitat (wetlands, native prairie, woody draws) will be avoided or minimized to the extent practicable; a plan to reclaim the native habitat that cannot be avoided; a monitoring plan to ensure that reclamation is successful and that non-natives do not take over; and a compensation plan for the impacts on native habitat that cannot be avoided. As part of the conservation plan, we recommend that Sunflower may consider purchasing perpetual grassland easements or perform additional habitat mitigation to ensure that the overall amount and quality of native habitat does not decline as a result of this project. In addition to benefitting migratory birds, the actions in the conservation plan may also benefit any candidate species that may be affected. Prairie conversion was a major factor in the decision to add the Sprague's pipit and Dakota skipper to the list of candidate species, so efforts to compensate for native prairie habitat loss could also be included as part of the conference on candidate species, if applicable.

Bald and Golden Eagles

Bald and Golden Eagles are federally-protected under both the BGEPA and the MBTA. The BGEPA prohibits anyone without a permit issued by the Secretary of the Interior from taking bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*), including their parts, nests, or eggs. The BGEPA provides criminal and civil penalties for persons who take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. The BGEPA defines take as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

The Service's overall management objective for golden eagle and bald eagle populations is to ensure no declines in breeding populations of either species. Numerous relatively minor disruptions to eagle behaviors from multiple activities, even if spatially or temporally distributed, may lead to disturbance that would not have resulted from fewer or more carefully sited activities. The accumulation of multiple land development projects or siting of multiple infrastructures that may be hazardous to eagles can cumulatively reduce the availability of alternative sites suitable for breeding, feeding, or sheltering, resulting in a greater than additive risk of take to eagles.

If your proposed activity is anticipated to result in take of bald or golden eagles, Sunflower must first apply for, and receive a permit to take prior to the taking. The determination of the likelihood of take will entail identifying the potential impacts to eagles of your proposed activity. According to the Service's data, there are no documented bald or golden eagle nests in proximity to Sunflower's proposed activity. However, there may be additional undocumented eagle nests in proximity to the proposed activity.

Recommendations Specific to Bald Eagles

The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in North Dakota, distance alone must often serve as the buffer. To avoid/minimize impacts to nesting bald eagles from construction activities, the Service recommends: (1) keeping a minimum ½-mile buffer between the activity and any bald eagle nest if no landscape buffer exists; (2) keeping a minimum 660-foot buffer and maintaining a landscape buffer or natural areas between the activity and around nest trees; and (3) avoiding activities during the bald eagle breeding season (February 1 – July 15). The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest sites and provide for alternative or replacement nest sites. The Service's May 2007, National Bald Eagle Management Guidelines contains detailed information on protecting bald eagles from disturbance due to human activity. The guidelines can be accessed on the Service's website at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

Recommendations Specific to Golden Eagles

Information available to the Service regarding all existing and recent breeding territory data indicates that golden eagles may be present in Sunflower's proposed activity area. Therefore, we recommend that Sunflower make every effort to avoid impacts to golden eagles. If activities are planned within a golden eagle territory, an assessment of the potential for take of a golden eagle will need to be made in conjunction with this office. This entails identifying the proposed activities that may occur in a golden eagle breeding territory, and sharing that information with this office.

The Service recommends that surveys be conducted prior to any on-the-ground activities to determine the extent of any golden eagle breeding territories in the area that may be affected by the proposed activity. The Service recommends that aerial nest surveys (preferably by helicopter) be conducted within a 1 mile wide evaluation corridor or buffer to identify any occupied and unoccupied eagle nest sites in proximity to the proposed project area, including any proposed new access roads. Aerial surveys should be conducted between March 1 and May 15, before leaf-out, so that nests are visible, and so their status (active or inactive) can be determined. A nesting territory or inventoried habitat should be designated as unoccupied by golden eagles ONLY after at least two complete aerial surveys in a single breeding season. Aerial surveys should include the following:

1. Due to the ability to hover and facilitate observations of the ground, helicopters are preferred over fixed wing aircraft, although small aircraft may also be used. The Service requests that [project proponent] report any eagle nests found, as well as nests of any other raptors found during the survey. Whenever possible, two observers should be used to conduct the surveys.
2. Observations of any eagle nest sites should be recorded using GPS. The date, location, nest condition, activity status, and habitat should be recorded for each sighting.
3. We request that you share the qualifications of the biologist(s) conducting the survey, method of survey, and results of the survey with the Service.

Alternatively, Sunflower could conduct ground surveys to identify golden eagle nests within a one-mile wide evaluation corridor or buffer between March 1 and May 15. However, be aware that ground surveys are much less reliable than aerial surveys, even during leaf-off conditions, and typically may miss ¾ of eagle nests present. At least two ground observation periods lasting at least four hours or more are necessary to designate an inventoried habitat or territory as unoccupied as long as all potential nest sites and alternate nests are visible and monitored. If a golden eagle nest is observed, the project proponent should contact the Service for further consultation.

Please note that maintenance of a minimum ½-mile buffer around active nests may not be adequate to ensure avoidance of take of golden eagles. If the project proponent or federal action agency, if applicable, in conjunction with the Service, determines that any level of take is anticipated, including take due to disturbance, you should work with this office to modify your activity to avoid the take, or apply for a take permit and include the following information:

1. Collect and synthesize relevant project and biological data.
2. Document project avoidance and minimization measures.
3. Quantify the anticipated take.
4. Submit an application and furnish all required information.

Water Bodies, Including Wetlands

Our review of National Wetland Inventory (NWI) maps indicates that wetland areas are located within the project area. NWI data can be accessed directly by visiting their website at http://wetlands.fws.gov. A Corps of Engineers (Corps) permit pursuant to Section 404 of the Clean Water Act may be required if dredge or fill material will be placed in waters of the United States, including certain wetlands. We recommend contacting the North Dakota Regulatory Program Manager, U.S. Army Corps of Engineers, 1513 South 12th Street, Bismarck, ND 58504; Phone: (701) 255-0015, to request their permit requirements. If a 404 permit is required, the Service will also provide recommendations on this project to the Corps.

Fish and Wildlife Service Property Interests

The Service administers National Wildlife Refuges and Waterfowl Production Areas owned in fee title as well as wetland and grassland easements throughout North Dakota, including an ongoing easement acquisition program. A review of Service realty records indicates there are no Service property interests located in the planning area.

Terrestrial Habitat Avoidance and Restoration

Construction activities should be conducted in a manner that will avoid/minimize impacts to the existing habitat in the project area. The following recommendations are intended to reduce construction related impacts:

- Make no stream channel alterations or changes in drainage patterns.
- Part of the proposed project intersects Heart Butte Creek a Class III substantial fishery resource. Heart Butte Creek is valued because of moderate forage production, the basis for maintaining the sport fish population further downstream. The stream channel also

provides habitat for migratory birds and furbearers. The Service recommends that precautions be taken during construction to avoid impacts to aquatic resources by maintaining the existing channel alignment of this stream and by eliminating the placement of fill in the channel. If impacts to aquatic resources cannot be avoided, the Service recommends developing a mitigation plan to offset project losses. As project planning progresses, please provide this office with a copy of the mitigation plan if this project will result in unavoidable impacts to aquatic resources. We also request the opportunity to review and comment on the project's construction plans if the channel alignment will be modified.

- Avoid placement of fill in wetlands.
- Replace unavoidable loss of wetland habitat with functionally equivalent wetlands
- Install and maintain appropriate erosion control measures to reduce sediment transport to adjacent wetlands and stream channels.
- In replanting native prairie or other grassland habitat, the Service recommends planting a diverse mixture of native cool and warm season grasses and forbs. Recent research has suggested that a more diverse mix, including numerous forb species, is not only ecologically beneficial but is also more weed resistant, allowing for less intensive management and chemical use. In essence, the more species included in a mixture, the higher the probability of providing competition to resist invasion by non-native plants. The seed source should be as local as possible, preferably collected from the nearby native prairie. If seeds and/or plants are obtained commercially, we recommend obtaining seed stock from nurseries within 250 miles of the project area to ensure the particular cultivars are well adapted to the local climate. The Natural Resources Conservation Service (NRCS) compiles a list of vendors in North Dakota that supply conservation seed and plants at: http://plant-materials.nrcs.usda.gov/pubs/ndpmcmt8152.pdf. Additional information on native grasses and forbs may be found at the NRCS Bismarck Plant Materials Center website at http://www.plant-materials.nrcs.usda.gov/ndpmc/.

Research, Monitoring, and Assessment

We recommend project proponents conduct two years of pre-construction wildlife surveys to quantify bird and bat use of the project area. Collision monitoring studies are recommended for three years post-construction to determine the effect of several factors, such as site selection, turbine designs, the layout of wind plants, wind plant operations, habitat alteration, and changes in available perching and nesting sites, on bird and bat deaths. Annual reports outlining the results of these monitoring studies should be submitted to this office. The Avian Subcommittee of the National Wind Coordinating Committee (NWCC) has developed a guidance document to assist wind energy developers in designing studies that will produce credible and comparable results of avian interaction with wind power plants. The NWCC document, "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," can be obtained by contacting the National Wind Coordination Committee, c/o RESOLVE, 1255 23rd Street, Suite 275, Washington, D.C. 20037, or by visiting their website at (www.nationalwind.org).

Thank you for the opportunity to comment on this project proposal. If you require further information, please have your staff contact Terry Ellsworth at (701) 250-4481 or at the letterhead address.

Sincerely,

for Jeffrey K. Towner
Field Supervisor
North Dakota Field Office

cc: North Dakota Public Service Commission, Bismarck
Director, North Dakota Game and Fish Department
(Attn: John Schumacher)

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
1513 SOUTH 12TH STREET
BISMARCK ND 58504-6640

REPLY TO
ATTENTION OF

August 12 2013

North Dakota Regulatory Office

Mr. Lou Hanebury
Department of Energy
Western Area Power Administration
Upper Great Plains Customer Service Region
PO Box 35800
Billings, Montana 59107-5800

Dear Mr. Hanebury:

This is in response to your request dated August 5, 2013, requesting US Army Corps of Engineers (Corps) comments regarding the Sunflower Wind Project that proposed construction of an approximate 80-MW wind farm to include up to 50 turbines, underground power collection system, substation, overhead transmission line, access roads, and maintenance and operation center located in Stark and Morton Counties, North Dakota.

Based on the information contained within your letter, it appears a Department of the Army permit may be required for all or part of your proposed project(s). In order for us to fully evaluate your project(s), please complete and submit the Corps permit application (copy enclosed). A wetland delineation and identification of other waters would be required for us to determine whether or not there are regulated waters on site. Be sure to accurately describe all proposed work and construction methodology. Once the application is complete, please mail it to the letterhead address.

Please be advised, Corps regulatory offices administer Section 10 of the Rivers and Harbors Act (Section 10) and Section 404 of the Clean Water Act (Section 404). Section 10 regulates work impacting navigable waters. Section 10 waters in North Dakota are the Missouri River (including Lake Sakakawea and Lake Oahe), Yellowstone River, James River south of the railroad track in Jamestown, North Dakota, Bois de Sioux River, Red River of the North, and the Upper Des Lacs Lake. Work over, in, or under navigable waters is considered to have an impact. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material (temporarily or permanently) in waters of the United States. Waters of the United States may include, but are not limited to, rivers, streams, ditches, coulees, lakes, ponds, and their adjacent wetlands. Fill material includes, but is not limited to, rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mines or other excavation activities and materials used to create any structure or infrastructure in waters of the United States.

Do not hesitate to contact this office by letter or telephone (701) 255-0015 if we can be of further assistance.

Sincerely,

Daniel E. Cimarosti

Daniel E. Cimarosti
State Program Manager
North Dakota Regulatory Office

Enclosure

U.S. ARMY CORPS OF ENGINEERS **APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT** 33 CFR 325. The proponent agency is CECW-CO-R.	***Form Approved - OMB No. 0710-0003 Expires: 31-AUGUST-2013***

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME First - Middle - Last - Company - E-mail Address -	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required) First - Middle - Last - Company - E-mail Address -
6. APPLICANT'S ADDRESS: Address- City - State - Zip - Country -	9. AGENT'S ADDRESS: Address- City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE a. Residence b. Business c. Fax	10. AGENTS PHONE NOs. w/AREA CODE a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, ________________________ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable) Address
15. LOCATION OF PROJECT Latitude: °N Longitude: °W	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section - Township - Range -

24. Is Any Portion of the Work Already Complete? ☐ Yes ☐ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list)

a. Address-

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army Permit Application

Blocks 1 through 4. To be completed by Corps of Engineers.

Block 5. Applicant's Name. Enter the name and the E-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the application, please attach a sheet with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the application. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where he / she can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by applicant, if an agent is to be employed.

Block 12. Proposed Project Name or Title. Please provide name identifying the proposed project, e.g., Landmark Plaza, Burned Hills Subdivision, or Edsall Commercial Center.

Block 13. Name of Waterbody. Please provide the name of any stream, lake, marsh, or other waterway to be directly impacted by the activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Project Street Address. If the proposed project is located at a site having a street address (not a box number), please enter it here.

Block 15. Location of Proposed Project. Enter the latitude and longitude of where the proposed project is located. If more space is required, please attach a sheet with the necessary information marked Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality that the site is located in.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide description of the proposed project location, such as lot numbers, tract numbers, or you may choose to locate the proposed project site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed project site if known

Block 18. Nature of Activity. Describe the overall activity or project. Give appropriate dimensions of structures such as wing walls, dikes (identify the materials to be used in construction, as well as the methods by which the work is to be done), or excavations (length, width, and height). Indicate whether discharge of dredged or fill material is involved. Also, identify any structure to be constructed on a fill, piles, or float-supported platforms.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 18.

Block 19. Proposed Project Purpose. Describe the purpose and need for the proposed project. What will it be used for and why? Also include a brief description of any related activities to be developed as the result of the proposed project. Give the approximate dates you plan to both begin and complete all work.

Vicinity Map

The vicinity map you provide will be printed in any public notice that is issued and used by the Corps of Engineers and other reviewing agencies to locate the site of the proposed activity. You may use an existing road map or US Geological Survey topographic (scale 1:24,000) as the vicinity map. Please include sufficient details to simplify locating the site from both the waterbody and from land. Identify the source of the map or chart from which the vicinity map was taken and, if not already shown, add the following:

- location of activity site (draw an arrow showing the exact location of the site on the map).
- latitude, longitude, river mile, if known, and/or other information that coincides with Block 6 on the application form.
- name of waterbody and the name of the larger creek, river, by, etc., that the waterbody is immediately tributary to.
- names, descriptions and location of landmarks.
- name of all applicable political (county, parish, borough, town, city, etc.) jurisdictions
- name of and distance to nearest town, community, or other identifying locations
- names or numbers of all roads in the vicinity of the site.
- north arrow.
- scale.

Plan View

The plan view shows the proposed activity as if you were looking straight down on it from above. your plan view should clearly show the following:

- Name of waterbody (river, creek, lake, wetland, etc.) and river mile (if known) at location of activity.
- Existing shorelines.
- Mean high and mean low water lines and maximum (spring) high tide line in tidal areas.
- Ordinary high water line and ordinary low water line if the proposed activity is located on a non-tidal waterbody.
- Average water depths around the activity.
- Dimensions of the activity and distance it extends from the high water line into the water.
- Distances to nearby Federal projects, if applicable.
- Distance between proposed activity and navigation channel, where applicable.
- Location of structures, if any, in navigable waters immediately adjacent to the proposed activity.
- Location of any wetlands (marshes, swamps, tidal flats, etc.)
- North arrow.
- Scale.
- If dredged material is involved, you must describe the type of material, number of cubic yards, method of handling, and the location of fill and spoil disposal area. The drawing should show proposed retention levees, weirs, and/or other means for retaining hydraulically placed materials.
- Mark the drawing to indicate previously completed portions of the activity.

Cross Section View and/or Elevation

The elevation and/or cross section view is a scale drawing that shows the side, front, or rear of the proposed activity. If a section view is shown, it represents the proposed structure as it would appear if cut internally for display. Your elevation should clearly show the following:

- Water elevations as shown in the plan view.

USINESS
PRIVATE USE, $300

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0004394104 AUG06 2013
MAILED FROM ZIP CODE 59101

SCHNEIDER, RICHARD
[redacted]

NIXIE 581 7E 1009 0008/12/13
RETURN TO SENDER
NOT DELIVERABLE AS ADDRESSED
UNABLE TO FORWARD
BC: 59107580000 *1636-08446-06-41

USINESS
PRIVATE USE, $300

MAILED FROM ZIP CODE 59101

KITZAN, BRIAN
[redacted]

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BC: 59107580000 *1636-08515-06-41

HANSEN ET AL, VERNA
[redacted]

NIXIE 581 5E 1009 0008/20/13
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BC: 59107580000 *1636-05551-06-41

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ZIMMERMAN, RICHARD
[redacted]

NIXIE 581 5E 1009 0008/20/13
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BC: 59107580000 *1636-05666-06-41

wapa received back 9/3/13

ARTMENT OF ENERGY
AREA POWER ADMINISTRATION
VENUE NORTH, 6TH FL
800
MT 59107-5800

BUSINESS
R PRIVATE USE, $300

UNITED STATES POSTAGE
PITNEY BOWES
02 1A $ 00.46⁰
0004394104 AUG 06 2013
MAILED FROM ZIP CODE 59101

not at this address

ANK 8/22

HOERAUF, ROLAND
[redacted]

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BC: 59107580000 *1636-03871-06-41

581029 59107 05800

Hanebury, Lou

From: [redacted]
Sent: Saturday, August 31, 2013 11:56 AM
To: Hanebury, Lou

Why to wind turbines.   Drive through Casper, WYO and see how ugly they are and they supply not the state they are in but other states and ruin the land and kill more birds than any oilfield does.
Sent from my Verizon Wireless 4G LTE DROID

Hanebury, Lou

From: [redacted]
Sent: Friday, August 09, 2013 8:54 AM
To: Hanebury, Lou
Subject: Sunflower Wind Project locations

Dear Mr. Hanebury,

I am in receipt of a letter from you dated August 5, 2013 regarding the above mentioned project. As I live in Colorado most of the year and will not be able to attend the scoping meeting I am hoping you can answer some questions for me.

1. Have locations for turbines been finalized?
2. What is the impact to the landowner where turbines are located?
3. Has the location for the substation been located and finalized?
4. What accessability for road/trail construction to get to all sites will occur?

I ask these questions as according to the map accompanying your letter it looks like the substation could be located on the west 1/2 of 139:91:22 which is our property (I do not have issue with this) and our other property located in the SW corner of the map area may also be contributing to a possible turbine location? (for this location existing access roads are already in place with Stark County Rd 79.

Any information you can provide is appreciated.

Tim Schlenvogt

Western
AREA POWER
ADMINISTRATION

Sunflower Wind Open House
August 22, 2013, 5-8 PM Hampton Inn and Suites
Dickinson, North Dakota
Public Comment Meeting
Environmental Assessment (EA)

Thank you for your interest in the proposed Sunflower Wind EA. Please complete the appropriate sections of this form to be included on the EA mailing list and/or to provide comments. Written comments can be submitted at the Scoping Meeting, faxed to (406) 255-2900, mailed to Mr. Lou Hanebury, Western Area Power Administration, Upper Great Plains Customer Service Office, P.O. Box 35800, Billings, MT 59107-5800 or sent to **hanebury@wapa.gov.** To be included in our public comment process, please ensure your comments are postmarked or turned in by **September 23, 2013.**

☒ I would like a paper copy of the Draft EA when it becomes available.
☐ I would like a Compact Disk (CD) of the EA when it becomes available.
☐ Just email me the web link to the EA when it becomes available. (Quickest and Preferred method)

Please Print Contact Info Below

Name: Richard Zimmerman	Organization:
E-mail address: [redacted]	Daytime Phone No. *(optional)*: [redacted]
Street Address: [redacted]	City / State / Zip Code: Bismarck, ND 58501

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

Western
AREA POWER
ADMINISTRATION

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Please Print Contact Info Below

Name:	Organization:
Clyde TERRAS	
E-mail address:	Daytime Phone No. *(optional)*:
	[redacted]
Street Address:	City / State / Zip Code:
[redacted]	HEBRON, ND 58638-0097

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Please Print Contact Info Below

Name: MAXINE FOLLMAN	Organization:
E-mail address: [redacted]	Daytime Phone No. (*optional*): [redacted]
Street Address: [redacted]	City / State / Zip Code: LEEDS ND 58346-0043

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

Western
AREA POWER
ADMINISTRATION

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Please Print Contact Info Below

Name: Roy & Vivian Bauer	Organization:
E-mail address:	Daytime Phone No. *(optional)*:
Street Address: [redacted]	City / State / Zip Code: Bismarck ND 58503

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

WESTERN AREA POWER ADMINISTRATION

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Please Print Contact Info Below

Name:	Organization:
Jerry Kuntz	
E-mail address:	**Daytime Phone No. (*optional*):**
	[redacted]
Street Address:	**City / State / Zip Code:**
[redacted]	Hebron ND 58638

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

[redacted]

Thank you for your time and interest.

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Please Print Contact Info Below

Name:	Organization:
Virginia + Eugene Unit	
E-mail address:	Daytime Phone No. *(optional)*:
Street Address:	City / State / Zip Code:
[redacted]	Bismarck ND 58503

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Please Print Contact Info Below

Name: John E Langer	Organization:
E-mail address:	Daytime Phone No. *(optional)*:

[redacted]

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Please Print Contact Info Below

Name: David Opp	Organization:
E-mail address:	Daytime Phone No. *(optional)*: [redacted]
Street Address: [redacted]	City / State / Zip Code: Hebron ND 58638

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Please Print Contact Info Below

Name: Duane Opp	Organization:
E-mail address:	Daytime Phone No. (*optional*): [redacted]
Street Address: [redacted]	City / State / Zip Code: Hebron N.D 58638

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Please Print Contact Info Below

Name:	Organization:
[redacted] 15	landowner
E-mail address:	Daytime Phone No. (*optional*):
Rick Ankelut	[redacted]
Street Address:	City / State / Zip Code:
[redacted]	

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

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Please Print Contact Info Below

Name:	Organization:
E-mail address: Roy Schneider III [redacted]	Daytime Phone No. (*optional*):
Street Address: [redacted]	City / State / Zip Code: Hebron, N. D. 58638

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- ☒ I would like a Compact Disk (CD) of the EA when it becomes available.
- ☐ Just email me the web link to the EA when it becomes available. (Quickest and Preferred method)

Please Print Contact Info Below

Name: M. A. HANSEN	Organization:
E-mail address: [redacted]	Daytime Phone No. (*optional*): [redacted]
[redacted]	City / State / Zip Code: HEBRON, ND. 58638

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

WESTERN AREA POWER ADMINISTRATION

Sunflower Wind Open House
August 22, 2013, 5-8 PM Hampton Inn and Suites
Dickinson, North Dakota
Public Comment Meeting
Environmental Assessment (EA)

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Please Print Contact Info Below

Name: Clyde Wanner	Organization:
E-mail address: [redacted]	Daytime Phone No. *(optional)*: [redacted]
Street Address: [redacted]	City / State / Zip Code: Dickinson ND 58601

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

Western
AREA POWER
ADMINISTRATION

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August 22, 2013, 5-8 PM Hampton Inn and Suites
Dickinson, North Dakota
Public Comment Meeting
Environmental Assessment (EA)

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Please Print Contact Info Below

Name: VERNA HANSEN	Organization:
E-mail address:	Daytime Phone No. *(optional)*:
Street Address: [redacted]	City / State / Zip Code: Nehrand, N.D. 58638

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

Western
AREA POWER
ADMINISTRATION

Sunflower Wind Open House
August 22, 2013, 5-8 PM Hampton Inn and Suites
Dickinson, North Dakota
Public Comment Meeting
Environmental Assessment (EA)

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Please Print Contact Info Below

Name:	Organization:
Evangeline Treiber	Land Owner
E-mail address:	Daytime Phone No. *(optional)*:
Street Address: [redacted]	City / State / Zip Code: Hebron, ND 58638

Please indicate any questions, comments or concerns you have about the proposed project in the comment section below (continue on separate sheet if necessary).

Thank you for your time and interest.

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Appendix C
Biological Surveys

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APPENDIX C BIOLOGICAL SURVEY REPORTS

CONTENTS:

- Raptor Nest Survey Report
- Sharp-Tailed Grouse Lek Survey Report
- Wildlife Baseline Studies Report and Avian Survey Update
- Habitat Report
- Bat Acoustic Monitoring Report
- Whooping Crane Habitat Review

ENVIRONMENTAL & STATISTICAL CONSULTANTS
4007 State Street, Suite 109, Bismarck, ND 58503
Phone: 701-250-1756 ◆ www.west-inc.com ◆ Fax: 701-250-1761

July 11, 2013

Casey Willis
Sunflower Wind Project, LLC
3760 State Street, Suite 102
Santa Barbara, CA 93105

RE: Sunflower Raptor Nest Surveys

Dear Mr. Willis,

As part of agency approved baseline survey efforts, surveys for raptor nests were completed at the Sunflower Wind Energy Project (Project) on April 2, 2013 by a qualified biologist from Western EcoSystems Technology, Inc. Surveys were completed from the air in a helicopter before leaf out when raptors would be actively tending to a nest or incubating eggs. Aerial surveys were conducted in accordance with the guidance provided in the U.S. Fish and Wildlife Service (USFWS) Inventory and Monitoring Protocols (Pagel et al. 2010). An experienced raptor ecologist and a helicopter pilot skilled at this type of survey were used. Raptors are defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls. Surveys focused on locating large, stick nest structures in suitable raptor nesting substrate (trees, transmission lines, cliff faces, etc.) within the proposed Project and a one mile buffer. Additionally, a second buffer was surveyed out to 10 miles to document any eagle nests (Figure 1). Efforts were made to minimize disturbance to nesting raptors; the greatest possible distance at which the species could be identified was maintained, with distances varying depending upon nest location and wind conditions.

In general, all potential eagle and raptor nest habitat was surveyed, flying at speeds of 60-75 mph throughout the proposed Project and associated buffers. Additionally, one known bald eagle (*Haliaeetus leucocephalus*) nest location provided by the North Dakota Game and Fish Department (NDGFD 2013) was surveyed for nest status and condition. The survey was conducted between 0800 hours and 1700 hours. The locations of all potential raptor nests were recorded using a hand-held Global Positioning System (GPS); coordinates were set at Universal Transverse Mercator (UTMs) North American Datum (NAD) 83 unit. This included all confirmed and potential nests regardless of their activity status. To determine the status of a nest, the biologist relied on clues that included behavior of adults and presence of eggs, young, or whitewash. Attempts were made to identify the species of raptor associated with each active nest. Additionally, date, nest condition, and habitat were recorded. Nests located incidentally during ongoing avian point count surveys started in spring 2013 have also been included with the nest survey results reported below.

During the 2013 aerial survey and/or incidentally during avian point counts, 18 raptor nests representing five species were documented within the Project and associated buffers (Tables 1 and 2; Figures 1 indicates bald eagle nests and 10 mile buffer and Figure 2 indicates raptor nets within 1 mile buffer). Of these nests, the historic eagle nest noted by the NDGFD was confirmed as an occupied bald eagle nest, four nests were identified as potential inactive bald eagle nests (i.e. large enough for a bald eagle to use), one occupied/active burrowing owl (*Athene cunicularia*) nest, three occupied/active great horned owl (*Bubo virginianus*) nests, three occupied/active red-tailed hawk (*Buteo jamaicensis*) nests, three occupied/active Swainson's hawk (Buteo swainsoni) nests, and three inactive raptor nests (Table 1, Figures 1 and 2). No potential or occupied bald eagle nests were located within the project or 1 mile buffer, all were approximately 8 miles or more from the project boundary (Figure 1)

Incidental observations included seven separate sightings of bald eagles flying or perched within the 10-mile buffer, as well as a potential bald eagle winter roost site along the Heart River (Table 3, Figure 1). The potential bald eagle winter roost consisted of several bald eagles of different ages perched in trees along the river during the morning hours. It is not known if this is a regular roost location.

If you have any questions or require additional information, please feel free to call me at 701-250-1756.

Sincerely,

Clayton Derby
Senior Manager

ENVIRONMENTAL & STATISTICAL CONSULTANTS

4007 State Street, Suite 109, Bismarck, ND 58503
Phone: 701-250-1756 ◆ www.west-inc.com ◆ Fax: 701-250-1761

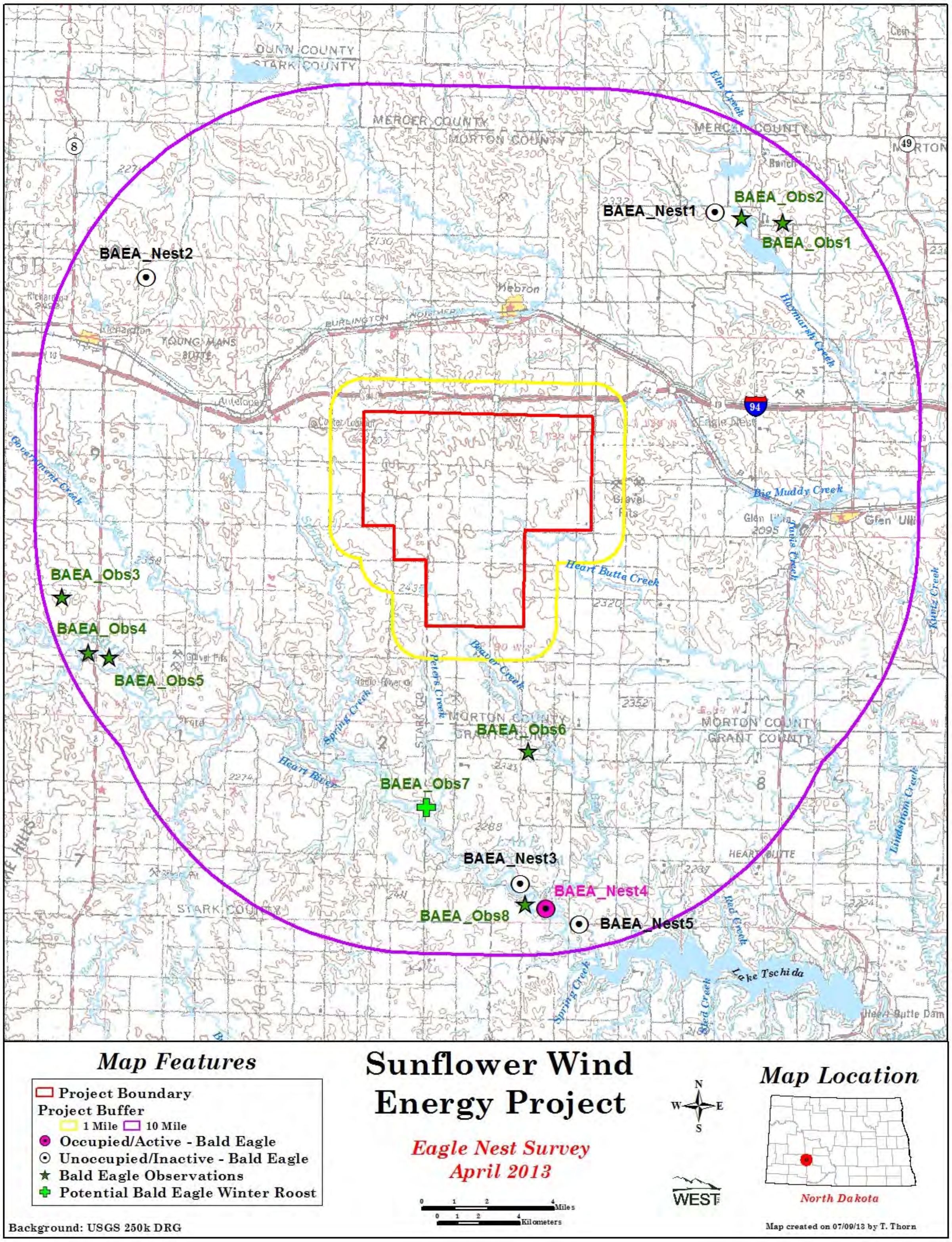

Figure 1. Bald eagle nests and bald eagle incidental observations documented at the Sunflower Wind Energy Project and 10-mile buffer in spring 2013.

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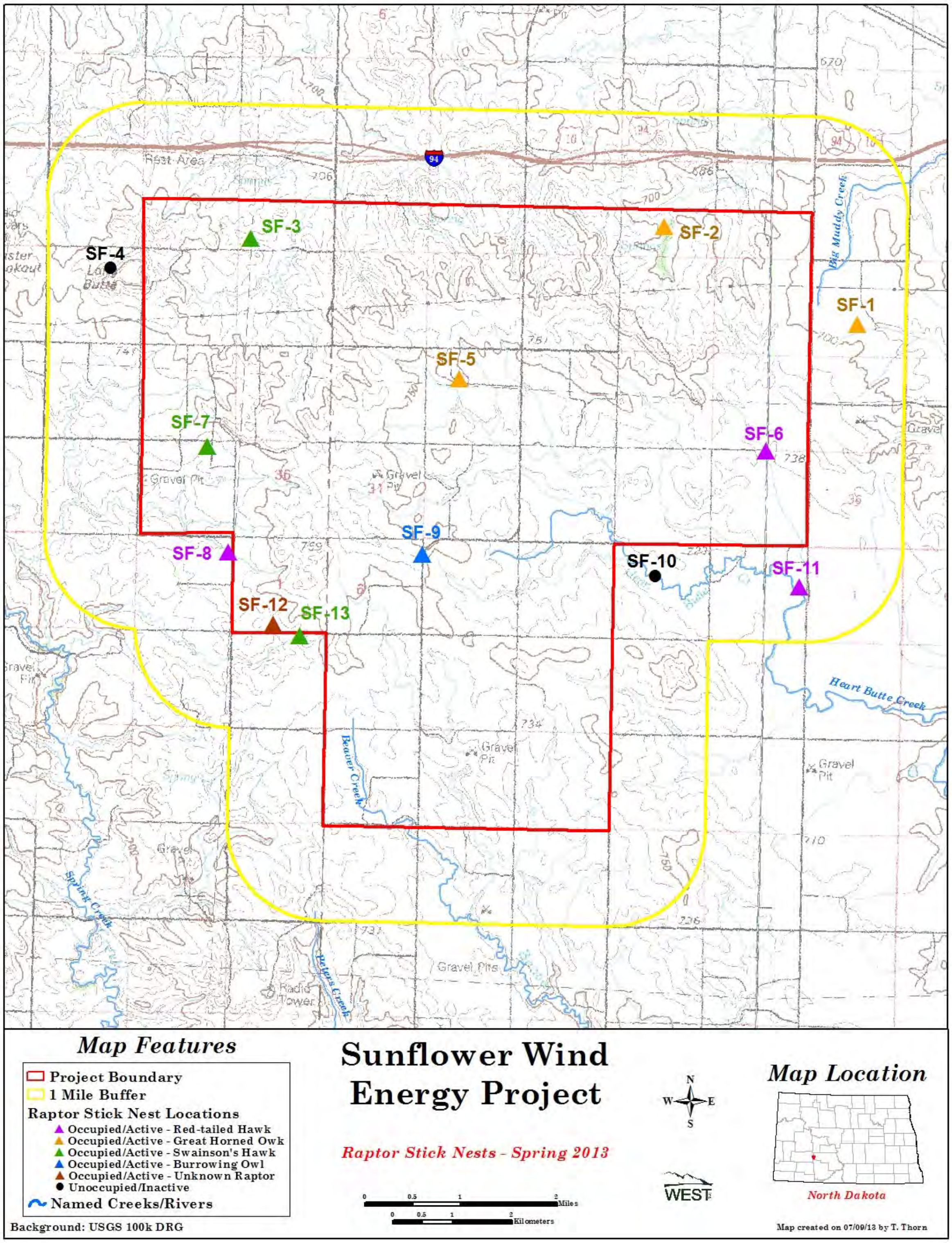

Figure 2. Raptor nests documented at the Sunflower Wind Energy Project in spring 2013.

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Table 1. Bald eagle nests and potential bald eagle nests identified during the 2013 survey for the Sunflower Wind Energy Project (NAD83, Zone 13).

Unique ID	Northing	Easting	Species	Nest Substrate	Status at time of Survey	Condition	Comments
BAEA_Nest1	5203810	734794	Potential Bald Eagle	Tree	Unoccupied – inactive	Good	Very large nest, eagle activity in the area
BAEA_Nest2	5198996	707105	Potential Bald Eagle	Tree	Unoccupied – inactive	Good	Very large nest with potential to be used by an eagle
BAEA_Nest3	5170347	727116	Potential Bald Eagle	Tree	Unoccupied – inactive	Good	Very large nest, eagle activity in the area
BAEA_Nest4	5169145	728457	Bald Eagle	Tree	Historic Occupied – active	Good	One adult sitting low in nest and second perched in tree close by
BAEA_Nest5	5168496	730096	Potential Bald Eagle	Tree	Unoccupied – inactive	Fair	Three nests stacked in one tree, eagle activity in the area

Table 2. Non-eagle raptor nests identified during the 2013 survey for the Sunflower Wind Energy Project (NAD83, Zone 14).

Unique ID	Northing	Easting	Species	Nest Substrate	Status at time of Survey	Condition
SF-1	5191511	272694	Great Horned Owl	Tree	Occupied – active	Good
SF-2	5193220	269476	Great Horned Owl	Tree	Occupied – active	Good
SF-3	5193152	262521	Swainson’s Hawk	Tree	Occupied – active	Good
SF-4	5192701	260147	Unknown Raptor	Tree	Unoccupied – inactive	Good
SF-5	5190730	265989	Great Horned Owl	Tree	Occupied – active	Good
SF-6	5189415	271112	Red-tailed Hawk	Tree	Occupied – active	Good
SF-7	5189679	261729	Swainson’s Hawk	Tree	Occupied – active	Good
SF-8	5187890	262038	Red-tailed Hawk	Tree	Occupied – active	Good
SF-9	5187793	265302	Burrowing Owl	Ground	Occupied – active	Good
SF-10	5187352	269208	Unknown Raptor	Tree	Unoccupied – inactive	Good
SF-11	5187127	271628	Red-tailed Hawk	Tree	Occupied – active	Good
SF-12	5186667	262774	Unknown Raptor	Tree	Occupied – active	Good
SF-13	5186465	263210	Swainson’s Hawk	Tree	Occupied – active	Good

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Table 3. Nest density for the Sunflower Wind Energy Project, based on raptor nest surveys.

Species	# of nests within Project	# of nests within 1-mi buffer of Project	# of nests within 10-mi buffer of Project	Density		
				Project (# of nests/mi^2)	1-mi buffer of Project (#nests/mi^2)	10-mi buffer of Project (#nests/mi^2)
Bald Eagle – Occupied, active	0	0	1	0	0	< 0.01
Potential Bald Eagle – Unoccupied, inactive	0	0	4	0	0	0.01
Burrowing Owl	1	0	0	0.03	0	0
Great horned Owl – Occupied, active	2	1	0	0.06	0.02	0
Red-tailed hawk – Occupied, active	1	2	0	0.03	0.03	0
Swainson's hawsk – Occupied, active	2	1	0	0.06	0.02	0
Unknown raptor – Occupied, active	1	0	0	0.03	0	0
Unknown raptor – Unoccupied, inactive	0	2	0	0	0.03	0
Total	**7**	**6**	**5**	**0.21**	**0.10**	**0.01**

Table 4. Bald eagle incidental observations during 2013 nest surveys for the Sunflower Wind Energy Project (NAD83, Zone 14).

Unique ID	Northing	Easting	Comments
BAEA_Obs1	5202750	281500	1 adult and 1 2nd year juvenile eating carrion
BAEA_Obs2	5203000	279500	1 adult perched in tree
BAEA_Obs3	5185000	245750	1 adult flying
BAEA_Obs4	5182250	247000	1 adult flying
BAEA_Obs5	5182000	248000	1 2nd year juvenile flying
BAEA_Obs6	5177000	268500	1 adult perched in tree
BAEA_Obs7	5175000	263000	1 2nd year juvenile and 8 adult eagles perched in the same tree, potential winter roost site
BAEA_Obs8	5169500	268200	2 adults flying

Wildlife Baseline Studies for the Sunflower Wind Project Morton and Stark Counties, North Dakota

2013 Sharp-tailed Grouse Lek Report

Prepared for:

Sunflower Wind Project, LLC,
a subsidiary of Infinity Wind Power
3760 State St., Suite 102
Santa Barbara, CA 93105

Prepared by:

Clayton Derby and Terri Thorn

Western EcoSystems Technology, Inc.
4007 State St., Suite 109
Bismarck, North Dakota

June 22, 2013

NATURAL RESOURCES ◆ SCIENTIFIC SOLUTIONS

Draft Pre-Decisional Document - Privileged and Confidential - Not For Distribution

EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. conducted sharp-tailed grouse lek aerial surveys in April and May 2013 at the Sunflower Wind Project which is located in Morton and Stark Counties, North Dakota. This report presents results of those surveys.

Approximately 308.1 kilometers (191.5 miles) of transects were surveyed during each of three time periods (April 10-11, April 22-23, and May 6-7). Eight confirmed (birds observed in courtship behavior at the same location during more than one survey) and five possible (birds observed in courtship behavior during only one survey) leks were recorded during the three survey periods. Six confirmed and three possible leks were observed within the project boundary while two confirmed and two possible leks were recorded outside the Sunflower Wind Project.

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INTRODUCTION

Sunflower Wind Project, LLC, a subsidiary of Infinity Wind Power (Infinity), is proposing to construct a wind energy facility in Morton and Stark Counties North Dakota referred to as the Sunflower Wind Project (SWP). Infinity contracted Western EcoSystems Technology, Inc. (WEST) to develop and implement a standardized protocol for baseline wildlife studies at the SWP to estimate impacts of the proposed wind energy facility on wildlife and to assist with siting turbines to minimize impacts to wildlife resources.

This report presents results of aerial sharp-tailed grouse (*Tympanuchus phasianellus*) lek surveys conducted during April and May 2013. Data includes sharp-tailed grouse lek locations, number observed, and lek status.

STUDY AREA

The SWP, currently about 21,647 acres (ac; 89 square kilometers [km^2]; 34 square miles [mi^2]) is located in west-central North Dakota and more specifically western Morton and eastern Stark Counties. The landscape within the SWP is generally flat with more rolling lands in the northern third of the project area. Historically, the SWP's landscape was dominated by grasslands but has since been converted largely to agricultural use with crop production and livestock grazing the primary practices. Trees and shrubs can be found around farmsteads, within planted shelter belts, and along/within drainages. Wetlands are scattered throughout the SWP with many being man-made.

METHODS

The objective of the aerial sharp-tailed grouse lek survey was to determine the approximate location of sharp-tailed grouse leks and provide a general sense of sharp-tailed grouse use within and immediately adjacent to the SWP during peak lekking activity (early April through mid-May). Survey methodology was similar to that used for greater prairie chickens (*Tympanuchus cupido*) in Oklahoma (Martin and Knopf 1981) and other wind sites in North and South Dakota.

North/south running transects started 800 meters (m; 0.5 miles [mi]) outside the east/west project boundary and were placed at 400 m (0.25 mi) intervals, covering the entire SWP (Figure 1). The length of each transect varied based on the project boundary but each transect extended 800 m (0.5 mi) beyond the boundary. Each transect was flown by fixed-winged aircraft at an approximate height of 30 to 45 m (100 – 150 feet) during three separate survey periods. Surveys were conducted approximately two weeks apart and occurred during the normal sharp-tailed grouse lekking period on the Northern Plains. Surveys began between 15 minutes before sunrise and sunrise depending on cloud cover and lasted for up to 2.5 hours.

The location of any sharp-tailed grouse observed was recorded with a global positioning system (GPS) unit. The number, activity, and lek status at each location was recorded.

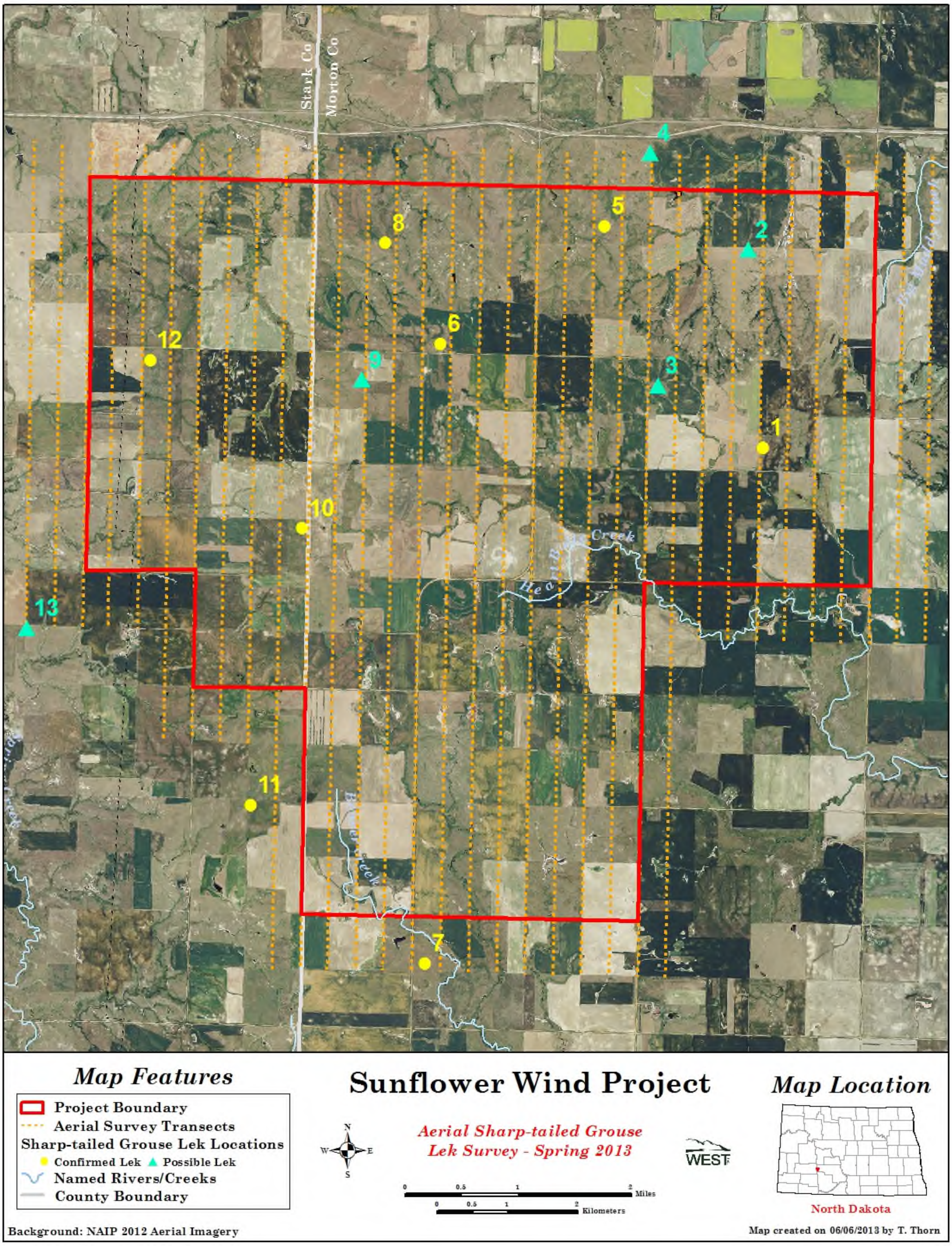

Figure 1. Sharp-tailed grouse leks at the Sunflower Wind Project during spring 2013.

RESULTS

Approximately 308.1 km (191.5 mi) of transects were surveyed during each of three time periods: (April 10-11, April 22-23, and May 6-7). Eight confirmed (birds observed in courtship behavior at the same location during more than one survey) and five possible (birds observed in courtship behavior during only one survey) leks were recorded during the three survey periods (Table 1; Figure 1). Six confirmed and three possible leks were observed within the project boundary while two confirmed and two possible leks were recorded outside the SWP (Figure 1). The nine leks within the SWP yields a density of one lek per 3.8 mi^2. The maximum number of sharp-tailed grouse record on leks ranged from seven at lek nine to 30 at lek 12 (Table 1). The majority of leks were observed within the northern half of the study area (Figure 1). All leks were recorded within grassland/hayland habitat.

Table 1. Summary of aerial sharp-tailed grouse lek surveys conducted during spring 2013 at the Sunflower Wind Project.

Lek ID	Date First Observed	Other Dates Observed	Highest Total	Lek
1	4/10	4/22, 5/06	21	confirmed
2	4/10		12	possible
3	4/10		14	possible
4	4/22		8	possible
5	4/10	4/22, 5/06	8	confirmed
6	4/10	4/22	9	confirmed
7	4/22	5/06	18	confirmed
8	4/10	4/22	16	confirmed
9	4/22		7	possible
10	4/11	4/23, 5/07	25	confirmed
11	4/11	4/23, 5/07	29	confirmed
12	4/11	4/23, 5/07	30	confirmed
13	5/07		18	possible

DISCUSSION

The majority of the SWP was lightly snow covered during the first survey period. The SWP was heavily snow covered during the second survey period due to a major winter storm on April 13th and 14th. It did not appear that snow cover, even significant snow cover, deterred sharp-tailed grouse from mating activities as evidenced by the number of leks initially observed or confirmed during the first two survey periods (Table 1).

Considering the preferred habitat requirements of sharp-tailed grouse, it is not surprising that the majority of leks were found within or adjacent to short grass habitat. This habitat type is found mainly along the north and west side of the study area. This survey was not intended to estimate the sharp-tailed grouse population in and around the SWP but the relative large number of birds recorded at some leks (30 at lek 12, 29 at lek 11, and 25 at lek 10) may suggest a healthy sharp-tailed grouse population within the area.

REFERENCES

Martin, S.A. and F.L. Knopf. 1981. Aerial Survey of Greater Prairie Chicken Leks. Wildlife Society Bulletin 9(3): 219-221.

Wildlife Baseline Studies for the Sunflower Wind Resource Area Morton and Stark Counties, North Dakota

FPIC Interim Report

March 2013 – August 2013

Prepared for:

Sunflower Wind Project, LLC

a subsidiary of Infinity Wind Power
3760 State St., Suite 102
Santa Barbara, California 93105

Prepared by:

Clayton Derby, Terri Thorn, and Kimberly Bay

Western EcoSystems Technology, Inc.
4007 State Street, Suite 109
Bismarck, North Dakota 58503

November 8, 2013

EXECUTIVE SUMMARY

Sunflower Wind Project, LLC, (Sunflower) a subsidiary of Infinity Wind Power, has proposed a wind energy facility in Morton and Stark Counties, North Dakota, referred to as the Sunflower Wind Project (SFWP). Sunflower contracted Western EcoSystems Technology, Inc. (WEST) to conduct surveys and monitor wildlife resources in the SFWP to estimate the impacts of facility construction and operations on wildlife. The following seasonal interim report contains results for fixed-point bird use surveys and incidental wildlife observations. Seasonal interim reports are designed to give Infinity an early warning of high wildlife use or if sensitive species are observed within the study area.

Fixed-point surveys included in this report were conducted from March 20, 2013, through August 21, 2013, at 10 points established throughout the SFWP. A total of 152 60-minute (min) fixed-point surveys were completed, and 65 unique bird species were identified; a total of 5,792 individual birds within 1,247 separate groups were recorded.

Passerines were the most abundant bird type observed, accounting for 84.2% of all observations. This was primarily due to relatively high numbers of Lapland longspurs (1,530 individuals but in only two groups). Waterbirds, represented almost entirely by sandhill cranes, were the second most abundant bird type observed in the study area, representing 6.1% of all observations. A total of 79 diurnal raptors were observed, accounting for 1.4% of all individuals recorded. Northern harrier and Swainson’s hawk were the most commonly observed raptor species (20 and 19 individuals, respectively). Two individual bald eagles were observed in the spring.

One bald eagle was observed from fixed-point two, soaring in a southeasterly direction for eight min before it was lost from sight. The other bald eagle observation was recorded flying into the survey plot at fixed-point one from the south. It remained perched on a transmission line tower for the remaining seven min of the 60-min survey period.

There were no federally listed endangered, threaten or candidate species observed. Sixteen unique sensitive species totaling 248 individuals were recorded during all surveys at the SFWP. Six North Dakota Level I sensitive species were observed along with 10 North Dakota Level II sensitive species.

Fourteen unique bird species and four unidentified bird categories were observed incidentally, totaling 958 birds within 69 separate groups during the study. Three species, tundra swan, prairie falcon, and Say’s phoebe, were only seen incidentally at the SFWP. Six mammal and one amphibian species were also recorded incidentally at the SFWP. Two North Dakota State Level I sensitive species (Swainson’s hawk and upland sandpiper) were recorded incidentally within the project area.

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INTRODUCTION

In 2013, Sunflower Wind Project, LLC (Sunflower), a subsidiary of Infinity Wind Power, contracted Western EcoSystems Technology, Inc. (WEST) to conduct surveys and monitor wildlife resources for the Sunflower Wind Project (SFWP) to estimate the impacts of wind energy facility construction and operations on wildlife. The following document contains results for fixed-point bird use surveys and incidental wildlife observations during spring and summer 2013 at the SFWP.

The purpose of this interim report is to bring items of biological interest to Sunflower's attention, such as seasonal diurnal raptor use and the presence of sensitive species. This interim report presents preliminary data on number of observations by species and bird type, eagle use, and sensitive species observations. The final report will include results for all data collected.

STUDY AREA

The SFWP is located in Morton and Stark Counties, North Dakota, approximately three miles (4.8 kilometers [km]) south of the town of Hebron (Figure 1). The baseline wildlife surveys included a 21,947 acre area (ac; 89 square kilometers [km^2]; 34 square miles [mi^2]) located in west-central North Dakota and more specifically western Morton and eastern Stark Counties. The SFWP project itself would be located on approximately 9,000 acres. The landscape within the SWP is generally flat with more rolling lands in the northern third of the project area. Elevation ranges from 679 meters (m; 2,228 feet [ft]) to 817 m (2,679 ft). Historically, the SFWP's landscape was dominated by grasslands, but has since been converted largely to agricultural use with crop production and livestock grazing being the primary practices. Trees and shrubs can be found around farmsteads, within planted shelter belts, and along/within drainages. Wetlands are scattered throughout the SFWP, with many being man-made.

Cultivated cropland and herbaceous/pasture/hay lands are approximately equal in amount and compose almost 95% of the study area. Of the remaining 5%, 3.5% is developed, while wetlands, forest, and barren lands, in that order, make up the rest of the landscape (USGS NLCD 2006, Fry et al. 2011). Common agricultural crops include small grains, corn (*Zea mays*), sunflowers (*Helianthus annuus*), and alfalfa (*Medigo sativa*).

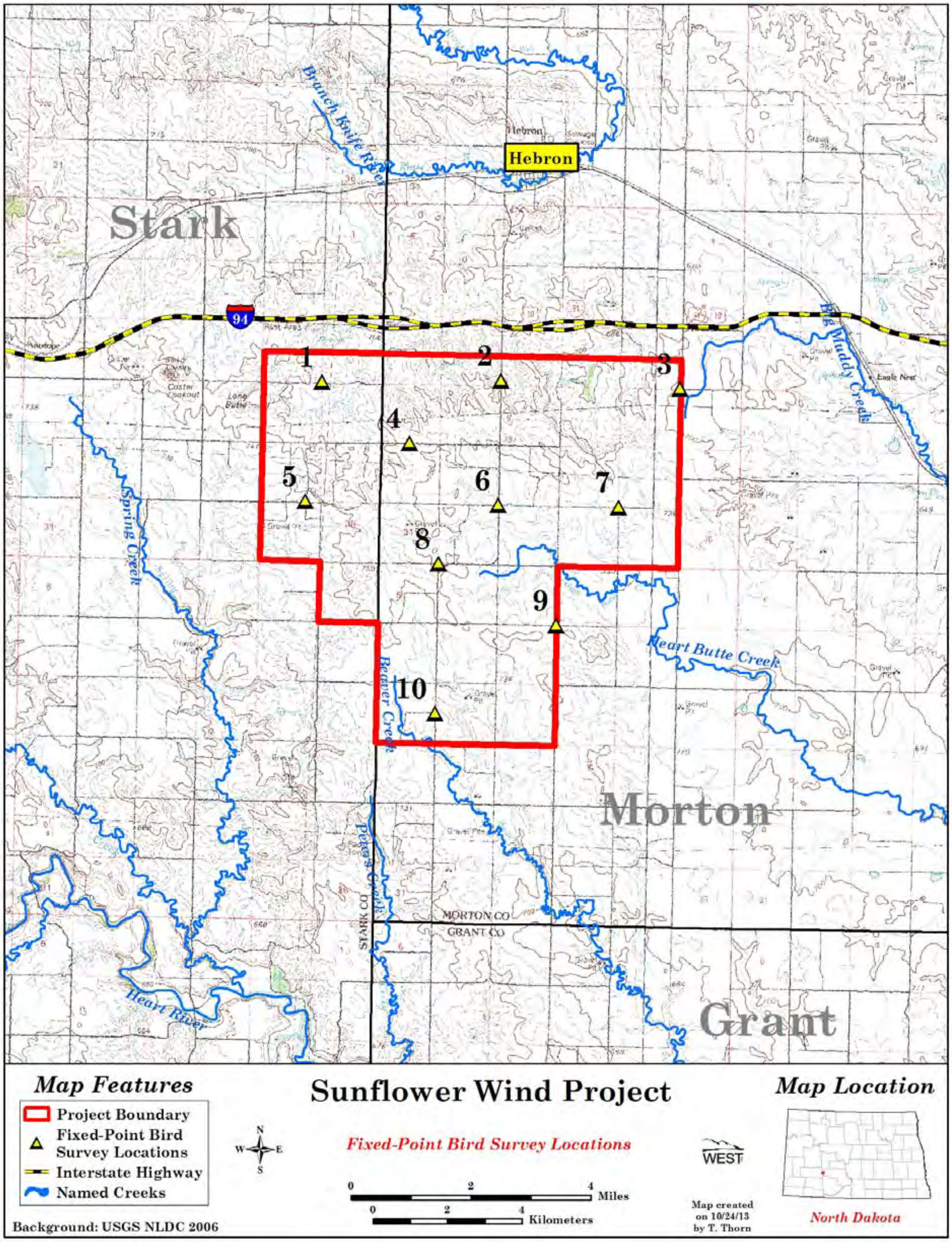

Figure 1. Fixed-point bird survey locations at the Sunflower Wind Project.

METHODS

Fixed-Point Bird Use Surveys

The objective of the fixed-point bird use surveys was to estimate the seasonal and spatial use of the study area by birds, particularly diurnal raptors (defined here as kites, accipiters, buteos, harriers, eagles, falcons, and osprey). Fixed-point bird surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980).

Survey Plots

Ten points were selected to survey representative habitats and topography of the SFWP, while achieving relatively even coverage of the study area (Figure 1). Each survey plot was a 1,600-m (5,250-ft or 1-mile) radius circle centered on the point.

Survey Methods

Each survey plot was surveyed for 60 minutes (min). Every bird observed during the first 20 min of each fixed-point bird use survey was recorded by a unique observation number. In some cases, the tally of observations may represent repeated sightings of the same individual. Observations of large birds beyond a 800-m (2,625-ft) radius were recorded, but were not included in statistical analyses. For small birds, observations beyond a 100 m (328 ft) radius were excluded. Large birds included waterbirds, waterfowl, rails and coots, grebes and loons, gulls and terns, shorebirds, diurnal raptors, owls, vultures, upland game birds, doves/pigeons, and large corvids (e.g., ravens, magpies, and crows), and goatsuckers. Passerines (excluding large corvids), kingfishers, swifts/hummingbirds, woodpeckers, and most cuckoos were considered small birds. During the next 40 min of the survey period, only eagles were recorded out to the 1,600-m radius.

The date, start and end time of the survey period, and weather information (e.g., temperature, wind speed, wind direction, and cloud cover) were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, altitude above ground, activity (behavior), and habitat(s) were recorded for each observation. Bird behavior and habitat type were recorded based on the point of first observation. Approximate flight height and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval. Other information recorded about the observation included whether or not the observation was auditory only and the 10-min interval of the 20-min survey in which it was first observed. Eagle observations had distance from observer, activity and flight height recorded by minute for as long as they were observed within 60-min survey period. Flight direction was recorded on the field map.

Observation Schedule

Sampling intensity was designed to document bird use and behavior by habitat and season within the study area. Fixed-point bird use surveys were conducted from March 2013 through August 2013. Surveys were conducted approximately once per week during the spring (March through May) and every other week during the summer (June through August). Surveys were carried out during daylight hours and survey periods varied to approximately cover all daylight hours during a season. To the extent practical, each point was surveyed roughly the same number of times.

Incidental Wildlife Observations

Incidental wildlife observations provide records of wildlife seen outside of the standardized surveys. All diurnal raptors, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded in a similar fashion to standardized surveys. The observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, height above ground (for bird species) and habitat were recorded. The location of sensitive species was recorded by reference to site specific features and/or by Universal Transverse Mercator (UTM) coordinates using a hand-held Global Positioning System (GPS) unit.

RESULTS

Surveys were completed within the SFWP from March 20, 2013, through August 21, 2013. Sixty-eight unique bird species, six mammal species, and one amphibian species were identified during the wildlife studies at the SFWP.

Fixed-Point Bird Use Surveys

A total of 152 60-min fixed-point bird use surveys were conducted within SFWP during 17 visits from March to August, 2013. Ninety-eight fixed-point surveys were conducted in the spring during 11 visits, while 54 fixed-point surveys were conducted in summer through August 21 during six visits. Not all point count locations were accessible during all surveys due to road conditions.

Sixty-five unique bird species were observed during fixed-point bird use surveys; a total of 5,792 individual birds were observed within 1,247 separate groups (defined as one or more individual) during the fixed-point surveys (Table 1). Passerines were the most abundant bird type observed, accounting for 84.2% of all observations. This was primarily due to relatively high numbers of Lapland longspurs (*Calcarius lapponicus*; 1,530 individuals but in only two groups). This species represents almost one-third of all passerines observed, but less than 1% of passerine groups recorded. Other common observed passerine species include common redpoll (*Acanthis flammea*; 642 individuals in 19 groups), horned lark (*Eremophila alpestris*; 627 individuals in 191 groups), and red-winged blackbirds (*Agelaius phoeniceus*; 653 individuals in 120 groups). Waterbirds, represented almost entirely by sandhill cranes (*Grus canadensis*), were the second most abundant bird type observed in the study area, representing 6.1% of all observations. A total of 79 diurnal raptors were observed, accounting for 1.4% of all individuals recorded. Northern harrier (*Circus cyaneus*) and Swainson's hawk (*Buteo swainsoni*) were the most commonly observed raptor species (20 and 19 individuals, respectively; Table 1). Two individual bald eagles (*Haliaeetus leucocephalus*) were observed in the spring (Table 1).

One bald eagle was observed from fixed-point two, soaring in a southeasterly direction for eight min before it was lost from sight. The other bald eagle observation was recorded flying into the survey plot at fixed-point one from the south. It remained perched on a transmission line tower for the remaining seven min of the 60-min survey period.

Table 1. Summary of group and individual observations by species and bird type for summer, fall, and overall seasons during fixed-point bird use surveys at the Sunflower Wind Project[a] from March 20, 2013, to August 21, 2013.

		Spring		Summer		Overall	
Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**2**	**352**	**0**	**0**	**2**	**352**
sandhill crane	*Grus canadensis*	1	350	0	0	1	350
unidentified waterbird		1	2	0	0	1	2
Waterfowl		**53**	**115**	**6**	**9**	**59**	**124**
blue-winged teal	*Anas discors*	1	2	0	0	1	2
Canada goose	*Branta canadensis*	22	53	1	1	23	54
gadwall	*Anas strepera*	1	4	0	0	1	4
mallard	*Anas platyrhynchos*	15	26	2	2	17	28
northern pintail	*Anas acuta*	4	8	1	1	5	9
northern shoveler	*Anas clypeata*	0	0	1	1	1	1
redhead	*Aythya americana*	1	2	0	0	1	2
unidentified duck		9	20	1	4	10	24
Shorebirds		**36**	**67**	**20**	**46**	**56**	**113**
Common snipe	*Gallinago gallinago*	2	2	0	0	2	2
killdeer	*Charadrius vociferus*	13	15	10	35	23	50
marbled godwit	*Limosa fedoa*	1	2	1	1	2	3
unidentified shorebird		6	22	0	0	6	22
upland sandpiper	*Bartramia longicauda*	6	6	8	9	14	15
willet	*Catoptrophorus semipalmatus*	4	14	0	0	4	14
Wilson's snipe	*Gallinago delicata*	4	6	1	1	5	7
Diurnal Raptors		**52**	**58**	**17**	**21**	**69**	**79**
Accipiters		*1*	*1*	*0*	*0*	*1*	*1*
sharp-shinned hawk	*Accipiter striatus*	1	1	0	0	1	1
Buteos		*21*	*25*	*9*	*11*	*30*	*36*
red-tailed hawk	*Buteo jamaicensis*	11	12	3	3	14	15
rough-legged hawk	*Buteo lagopus*	2	2	0	0	2	2
Swainson's hawk	*Buteo swainsoni*	8	11	6	8	14	19
Northern Harrier		*16*	*17*	*3*	*3*	*19*	*20*
northern harrier	*Circus cyaneus*	16	17	3	3	19	20
Eagles		*2*	*2*	*0*	*0*	*2*	*2*
bald eagle	*Haliaeetus leucocephalus*	2	2	0	0	2	2
Falcons		*1*	*1*	*0*	*0*	*1*	*1*
American kestrel	*Falco sparverius*	1	1	0	0	1	1
Other Raptors		*11*	*12*	*5*	*7*	*16*	*19*
unidentified hawk		3	3	0	0	3	3
unidentified raptor		8	9	5	7	13	16
Owls		**5**	**7**	**4**	**7**	**9**	**14**
burrowing owl	*Athene cunicularia*	3	5	4	7	7	12
great horned owl	*Bubo virginianus*	2	2	0	0	2	2
Vultures		**3**	**5**	**1**	**1**	**4**	**6**
turkey vulture	*Cathartes aura*	3	5	1	1	4	6

Table 1. Summary of group and individual observations by species and bird type for summer, fall, and overall seasons during fixed-point bird use surveys at the Sunflower Wind Project[a] from March 20, 2013, to August 21, 2013.

		Spring		Summer		Overall	
Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Upland Game Birds		**87**	**129**	**10**	**10**	**97**	**139**
ring-necked pheasant	*Phasianus colchicus*	80	90	10	10	90	100
sharp-tailed grouse	*Tympanuchus phasianellus*	7	39	0	0	7	39
Doves/Pigeons		**24**	**38**	**20**	**29**	**44**	**67**
mourning dove	*Zenaida macroura*	22	35	20	29	42	64
rock pigeon	*Columba livia*	2	3	0	0	2	3
Large Corvids		**6**	**10**	**0**	**0**	**6**	**10**
American crow	*Corvus brachyrhynchos*	6	10	0	0	6	10
Passerines		**679**	**4548**	**211**	**327**	**890**	**4875**
American goldfinch	*Spinus tristis*	0	0	1	1	1	1
American robin	*Turdus migratorius*	22	61	3	3	25	64
American tree sparrow	*Spizella arborea*	4	36	0	0	4	36
bank swallow	*Riparia riparia*	0	0	1	2	1	2
barn swallow	*Hirundo rustica*	8	14	6	19	14	33
bobolink	*Dolichonyx oryzivorus*	12	25	4	4	16	29
Brewer's blackbird	*Euphagus cyanocephalus*	7	24	1	4	8	28
brown-headed cowbird	*Molothrus ater*	58	288	9	15	67	303
brown thrasher	*Toxostoma rufum*	0	0	2	2	2	2
chipping sparrow	*Spizella passerina*	3	3	1	1	4	4
clay-colored sparrow	*Spizella pallida*	4	4	1	1	5	5
cliff swallow	*Petrochelidon pyrrhonota*	0	0	1	2	1	2
common grackle	*Quiscalus quiscula*	15	40	9	12	24	52
common redpoll	*Acanthis flammea*	19	642	0	0	19	642
eastern kingbird	*Tyrannus tyrannus*	7	7	31	43	38	50
European starling	*Sturnus vulgaris*	4	81	1	27	5	108
field sparrow	*Spizella pusilla*	1	1	0	0	1	1
grasshopper sparrow	*Ammodramus savannarum*	3	4	3	3	6	7
horned lark	*Eremophila alpestris*	169	586	22	41	191	627
Lapland longspur	*Calcarius lapponicus*	2	1530	0	0	2	1530
lark bunting	*Calamospiza melanocorys*	1	2	9	11	10	13
loggerhead shrike	*Lanius ludovicianus*	1	1	0	0	1	1
red-winged blackbird	*Agelaius phoeniceus*	87	611	33	42	120	653
Savannah sparrow	*Passerculus sandwichensis*	13	20	9	10	22	30
snow bunting	*Plectrophenax nivalis*	2	48	0	0	2	48
song sparrow	*Melospiza melodia*	8	10	0	0	8	10
unidentified blackbird		0	0	2	3	2	3
unidentified bluebird		2	2	0	0	2	2
unidentified passerine		14	249	2	3	16	252
unidentified sparrow		11	12	2	2	13	14
vesper sparrow	*Pooecetes gramineus*	3	3	7	8	10	11
western kingbird	*Tyrannus verticalis*	7	12	15	30	22	42
western meadowlark	*Sturnella neglecta*	190	227	35	37	225	264
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	1	4	0	0	1	4
yellow warbler	*Setophaga petechia*	1	1	1	1	2	2
Goatsuckers		**0**	**0**	**1**	**1**	**1**	**1**
common nighthawk	*Chordeiles minor*	0	0	1	1	1	1

Table 1. Summary of group and individual observations by species and bird type for summer, fall, and overall seasons during fixed-point bird use surveys at the Sunflower Wind Project[a] from March 20, 2013, to August 21, 2013.

		Spring		Summer		Overall	
Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Woodpeckers		**7**	**7**	**1**	**3**	**8**	**10**
hairy woodpecker	*Picoides villosus*	1	1	0	0	1	1
northern flicker	*Colaptes auratus*	5	5	1	3	6	8
red-headed woodpecker	*Melanerpes erythrocephalus*	1	1	0	0	1	1
Unidentified Birds		**2**	**2**	**0**	**0**	**2**	**2**
unidentified bird (small)		2	2	0	0	2	2
Total		**956**	**5,338**	**291**	**454**	**1247**	**5,792**

[a] regardless of distance from observer.

Sensitive Species Observations

Sixteen unique sensitive species totaling 248 individuals were recorded during all surveys at the SFWP (Table 2). This tally may represent repeated observations of the same individual. There were no federally listed endangered, threaten or candidate species recorded. Six North Dakota Level I sensitive species (defined as species with declining status either in North Dakota or across their range) were observed, along with 10 North Dakota Level II sensitive species (defined as species with moderate level of conservation priority; Hagen et al. 2005; Table 2). Bald eagles are also protected under the Bald and Golden Eagle Protection Act (BGEPA 1940).

Table 2. Summary of sensitive species observed at the Sunflower Wind Project during fixed-point bird use surveys (FP) and as incidental wildlife observations (Inc.) from March 20, 2013, to August 21, 2013.

			FP		Inc.		Total	
Species	**Scientific Name**	**Status**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
sharp-tailed grouse	*Tympanuchus phasianellus*	S2	7	39	7	30	14	69
northern harrier	*Circus cyaneus*	S2	19	20	9	13	28	33
Swainson's hawk	*Buteo swainsoni*	S1	14	19	8	13	22	32
bobolink	*Dolichonyx oryzivorus*	S2	16	29	0	0	16	29
upland sandpiper	*Bartramia longicauda*	S1	14	15	1	3	15	18
willet	*Catoptrophorus semipalmatus*	S1	4	14	0	0	4	14
burrowing owl	*Athene cunicularia*	S2	7	12	1	1	8	13
lark bunting	*Calamospiza melanocorys*	S1	10	13	0	0	10	13
northern pintail	*Anas acuta*	S2	5	9	0	0	5	9
grasshopper sparrow	*Ammodramus savannarum*	S1	6	7	0	0	6	7
marbled godwit	*Limosa fedoa*	S1	2	3	0	0	2	3
loggerhead shrike	*Lanius ludovicianus*	S2	1	1	1	1	2	2
bald eagle	*Haliaeetus leucocephalus*	S2; EA	2	2	0	0	2	2
redhead	*Aythya americana*	S2	1	2	0	0	1	2
prairie falcon	*Falco mexicanus*	S2	0	0	1	1	1	1
red-headed woodpecker	*Melanerpes erythrocephalus*	S2	1	1	0	0	1	1
Total	**16 species**		**109**	**186**	**28**	**62**	**137**	**248**

S1 = Level I state species of concern (Hagen et al. 2005); S2 = Level II state species of concern (Hagen et al. 2005); EA = Federal Bald and Golden Eagle Protection Act (BGEPA 1940).

Incidental Wildlife Observations

Fourteen unique bird species and four unidentified bird categories were observed incidentally, totaling 958 birds within 69 separate groups during the study (Table 3). Over two-thirds of the total observations were of sandhill cranes. Three species, tundra swan (*Cygnus columbianus*), prairie falcon (*Falco mexicanus*), and Say's phoebe (*Sayornis saya*), were only seen incidentally at the SFWP. Six mammal and one amphibian species were also recorded incidentally at the SFWP (Table 3). Two North Dakota State Level I sensitive species (Swainson's hawk and upland sandpiper [*Bartramia longicauda*]) were recorded incidentally within the project (Table 2).

Table 3. Incidental wildlife observed while conducting all surveys at the Sunflower Wind Project from March 20, 2013, to August 21, 2013.

Species	Scientific Name	# grps	# obs
sandhill crane	*Grus canadensis*	9	654
tundra swan	*Cygnus columbianus*	1	2
upland sandpiper	*Bartramia longicauda*	1	3
American kestrel	*Falco sparverius*	6	7
northern harrier	*Circus cyaneus*	9	13
prairie falcon	*Falco mexicanus*	1	1
red-tailed hawk	*Buteo jamaicensis*	12	14
Swainson's hawk	*Buteo swainsoni*	8	13
unidentified accipiter		1	1
unidentified hawk		2	5
unidentified raptor		3	4
burrowing owl	*Athene cunicularia*	1	1
turkey vulture	*Cathartes aura*	4	6
gray partridge	*Perdix perdix*	1	2
sharp-tailed grouse	*Tympanuchus phasianellus*	7	30
loggerhead shrike	*Lanius ludovicianus*	1	1
Say's phoebe	*Sayornis saya*	1	1
unidentified crowned sparrow		1	200
Bird Subtotal		**69**	**958**
coyote	*Canis latrans*	3	3
mule deer	*Odocoileus hemionus*	1	5
porcupine	*Erethizon dorsatum*	2	2
pronghorn	*Antilocapra americana*	11	57
thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*	4	8
white-tailed jackrabbit	*Lepus townsendii*	1	1
Mammal Subtotal		**22**	**76**
western chorus frog	*Pseudacris triserata triseriata*	2	20
Amphibian Subtotal		**2**	**20**

DISCUSSION

The surveys implemented at SFWP during spring and summer of 2013 are part of a larger study effort. Seasonal interim reports are designed to give Infinity an early warning if high wildlife use is documented during surveys or if a sensitive species is observed.

Bird Use Surveys

Species diversity of birds observed reflected the grassland and agricultural habitat within the SFWP. Species of open grassland habitats were dominant, but species that utilize woodlands and wetlands were also observed interspersed within the study area.

By far, the spring season had the higher number of bird observations (5,338) compared to summer (454). Although the spring season had almost twice as many surveys conducted, it is unlikely that doubling the number of surveys in summer would have resulted in the total number of birds observed to approach those recorded in spring. Lapland longspur and common redpoll had the highest number of individuals recorded and were only observed in the spring. In total, there were 26 bird species that were recorded in spring that were not recorded in the summer, while there were only four species that were observed in the summer that were not recorded in the spring.

Overall, diurnal raptors were also more common in the spring; birds observed during the spring probably included migrating individuals. The Swainson's hawk was the most abundant diurnal raptor recorded during the summer (Table 1).

Comparison of Seasonal Diurnal Raptor Use

Diurnal raptors have received much attention due to high rates of fatalities at the Altamont Pass wind energy facility in California, which has the highest recorded overall diurnal raptor fatality rate of any wind energy facility (Erickson et al. 2002b). Based on the results from other wind resource areas, mean diurnal raptor use (number of diurnal raptors divided by the number of 800-m plots and the total number of surveys) in the SFWP during both the spring and summer of 2013 was low to moderate (0.53 and 0.35 diurnal raptors/plot/20 min survey, respectively) relative to data collected at other existing and proposed wind energy facilities with data for spring or summer seasons (Figures 2 and 3).

Sensitive Species

No federally endangered, threatened or candidate species were recorded during surveys within the SFWP. There were six North Dakota Level I and 10 Level II sensitive species recorded. Two State Level II bald eagles were observed during fixed-point surveys. Bald eagles are also legally protected under the Bald and Golden Eagle Protection Act (BGEPA 1940).

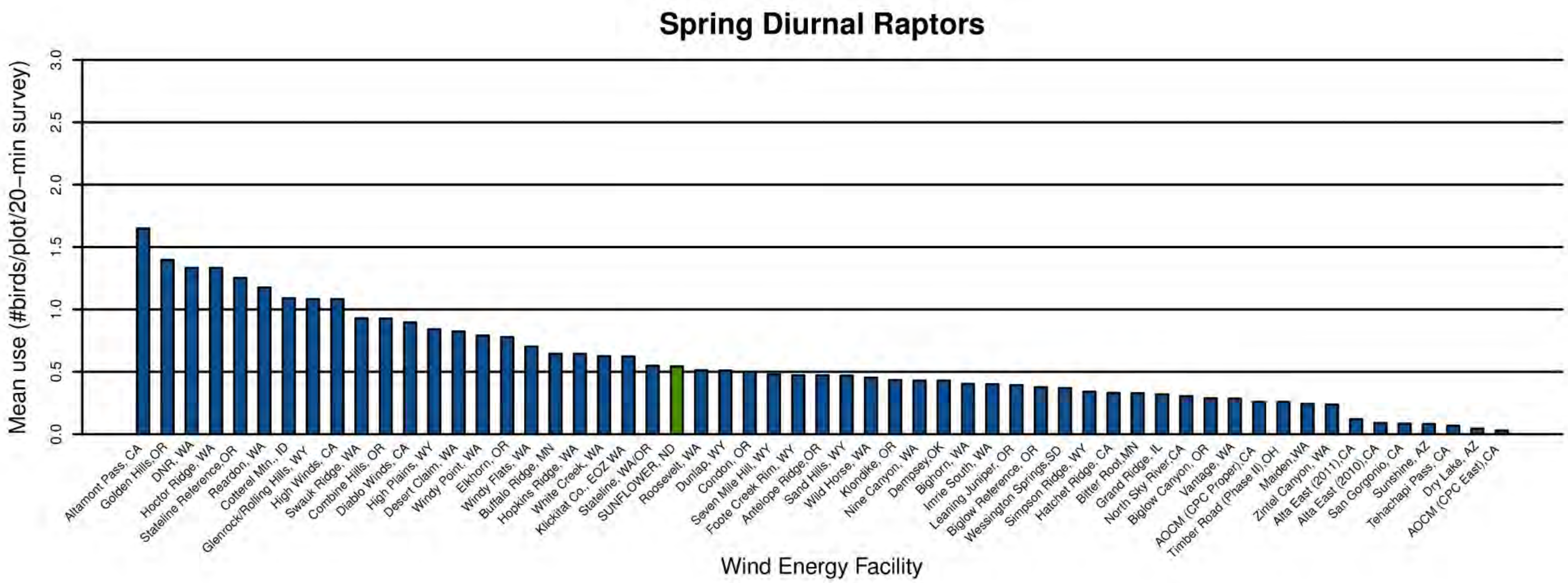

Figure 2. Comparison of spring diurnal raptor use during fixed-point surveys at the Sunflower Wind Project from March 20, 2013, to August 21, 2013, and other US wind energy facilities.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference	Study and Location	Reference
Sunflower Wind Project, ND	This study.				
Altamont Pass, CA	Orloff and Flannery 1992	White Creek, WA	NWC and WEST 2004	Simpson Ridge, WY	Johnson et al. 2000b
Golden Hills, OR	Jeffrey et al. 2008	Klickitat Co., EOZ WA	WEST and NWC 2003	Hatchet Ridge, CA	Young et al. 2007a
DNR, WA	Johnson et al. 2006c	Stateline, WA/OR	Erickson et al. 2003a	Bitter Root, MN	Derby and Dahl 2009
Hoctor Ridge, WA	Johnson et al. 2006d	Roosevelt, WA	NWC and WEST 2004	Grand Ridge, IL	Derby et al. 2009
Stateline Reference, OR	URS et al. 2001	Dunlap, WY	Johnson et al. 2009a	North Sky River, CA	Erickson et al. 2011
Reardon, WA	WEST 2005b	Condon, OR	Erickson et al. 2002b	Biglow Canyon, OR	WEST 2005c
Cotterel Mtn., ID	BLM 2006	Seven Mile Hill, WY	Johnson et al. 2008b	Vantage, WA	WEST 2007
Glenrock/Rolling Hills, WY	Johnson et al. 2008a	Foote Creek Rim, WY	Johnson et al. 2000b	AOCM (CPC Proper), CA	Chatfield et al. 2010
High Winds, CA	Kerlinger et al. 2005	Antelope Ridge, OR	WEST 2009	Timber Road (Phase II), OH	Good et al. 2010
Swauk Ridge, WA	Erickson et al. 2003b	Sand Hills, WY	Johnson et al. 2006a	Maiden, WA	Young et al. 2002
Combine Hills, OR	Young et al. 2003c	Wild Horse, WA	Erickson et al. 2003d	Zintel Canyon, WA	Erickson et al. 2002a, 2003c
Diablo Winds, CA	WEST 2006	Klondike, OR	Johnson et al. 2002	Alta East (2011), CA	Chatfield et al. 2011
High Plains, WY	Johnson et al. 2009b	Nine Canyon, WA	Erickson et al. 2001	Alta East (2010), CA	Chatfield et al. 2011
Desert Claim, WA	Young et al. 2003b	Dempsey, OK	Derby et al. 2010	San Gorgonio, CA	Anderson et al. 2000, Erickson et al. 2002b
Windy Point, WA	Johnson et al. 2006b	Bighorn, WA	Johnson and Erickson 2004	Sunshine, AZ	WEST and the CPRS 2006
Elkhorn, OR	WEST 2005a	Imrie South, WA	Johnson et al. 2006e	Tehachapi Pass, CA	Anderson et al. 2000, Erickson et al. 2002b
Windy Flats, WA	Johnson et al. 2007b	Leaning Juniper, OR	Kronner et al. 2005	Dry Lake, AZ	Young et al. 2007b
Buffalo Ridge, MN	Johnson et al. 2000a	Biglow Reference, OR	WEST 2005c	AOCM (CPC East), CA	Chatfield et al. 2010
Hopkins Ridge, WA	Young et al. 2003a	Wessington Springs, SD	Derby et al. 2008		

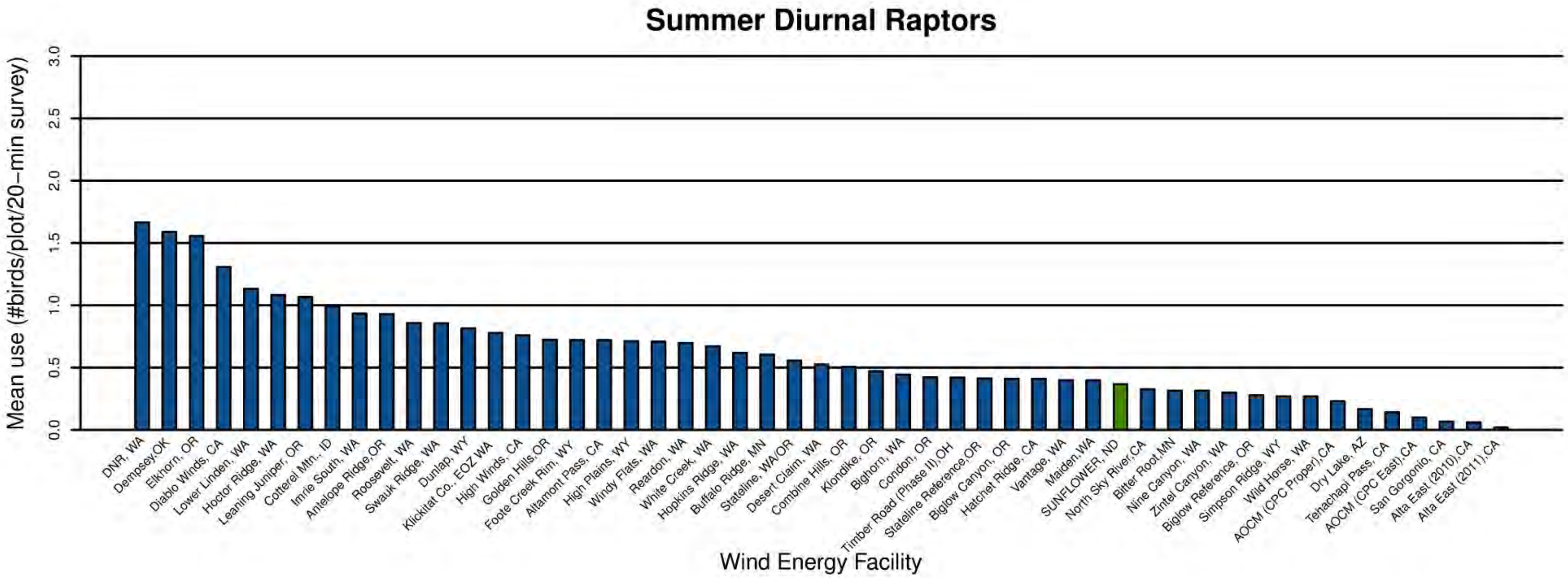

Figure 3. Comparison of summer diurnal raptor use during fixed-point surveys at the Sunflower Wind Project from March 20, 2013, to August 21, 2013, and other US wind energy facilities.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference	Study and Location	Reference
Sunflower Wind Project, ND	This study.				
DNR, WA	Johnson et al. 2006c	Altamont Pass, CA	Orloff and Flannery 1992	Vantage, WA	WEST 2007
Dempsey, OK	Derby et al. 2010	High Plains, WY	Johnson et al. 2009b	Maiden, WA	Young et al. 2002
Elkhorn, OR	WEST 2005a	Windy Flats, WA	Johnson et al. 2007b	North Sky River, CA	Erickson et al. 2011
Diablo Winds, CA	WEST 2006	Reardon, WA	WEST 2005b	Bitter Root, MN	Derby and Dahl 2009
Lower Linden, WA	Johnson et al. 2007a	White Creek, WA	NWC and WEST 2005	Nine Canyon, WA	Erickson et al. 2001
Hoctor Ridge, WA	Johnson et al. 2006d	Hopkins Ridge, WA	Young et al. 2003a	Zintel Canyon, WA	Erickson et al. 2002a, 2003c
Leaning Juniper, OR	Kronner et al. 2005	Buffalo Ridge, MN	Johnson et al. 2000a	Biglow Reference, OR	WEST 2005c
Cotterel Mtn., ID	BLM 2006	Stateline, WA/OR	Erickson et al. 2003a	Simpson Ridge, WY	Johnson et al. 2000b
Imrie South, WA	Johnson et al. 2006e	Desert Claim, WA	Young et al. 2003b	Wild Horse, WA	Erickson et al. 2003d
Antelope Ridge, OR	WEST 2009	Combine Hills, OR	Young et al. 2003c	AOCM (CPC Proper), CA	Chatfield et al. 2010
Roosevelt, WA	NWC and WEST 2004	Klondike, OR	Johnson et al. 2002	Dry Lake, AZ	Young et al. 2007b
Swauk Ridge, WA	Erickson et al. 2003b	Bighorn, WA	Johnson and Erickson 2004	Tehachapi Pass, CA	Anderson et al. 2000, Erickson et al. 2002b
Dunlap, WY	Johnson et al. 2009a	Condon, OR	Erickson et al. 2002b	AOCM (CPC East), CA	Chatfield et al. 2010
Klickitat Co., EOZ WA	WEST and NWC 2003	Timber Road (Phase II), OH	Good et al. 2010	San Gorgonio, CA	Anderson et al. 2000, Erickson et al. 2002b
High Winds, CA	Kerlinger et al. 2005	Stateline Reference, OR	URS et al. 2001	Alta East (2010), CA	Chatfield et al. 2011
Golden Hills, OR	Jeffrey et al. 2008	Biglow Canyon, OR	WEST 2005c	Alta East (2011), CA	Chatfield et al. 2011
Foote Creek Rim, WY	Johnson et al. 2000b	Hatchet Ridge, CA	Young et al. 2007a		

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February 11, 2014

Casey Willis
Sunflower Wind Project, LLC.
3760 State Street, Suite 102
Santa Barbara, CA 93105

RE: Sunflower Avian Use Fall and Winter Update

Dear Mr. Willis,

Western EcoSystems Technology, Inc. (WEST) was contracted to conduct avian use point counts at the proposed Sunflower project area in central North Dakota. See attached map, and corresponding point count locations currently being surveyed. Surveys started in mid-March 2013 and are continuing to date. Surveys were done weekly during the spring and fall migration periods and twice per month during the summer and winter period. Each point is surveyed for one hour during each visit.

WEST provided an interim report detailing observations and initial analysis of data from project start on March 20 through August 21, 2013. This memo updates information collected during surveys conducted between late August 2013 and early February 2014. During the fall and winter surveys to date, a total of 61 raptors observations were documented spread among seven species, including observations at all distances from the observer during point counts. The most common raptor species observed was northern harrier. One bald eagle and four golden eagles were observed during point counts. See the attached table for a complete list of species and observations made during the point counts from late August 2013 through early February 2014. The overall species and numbers appear to be reflective of a grassland landscape in central North Dakota.

Please let me know if you have any questions or need further details.

Sincerely,

Clayton Derby
Senior Manager

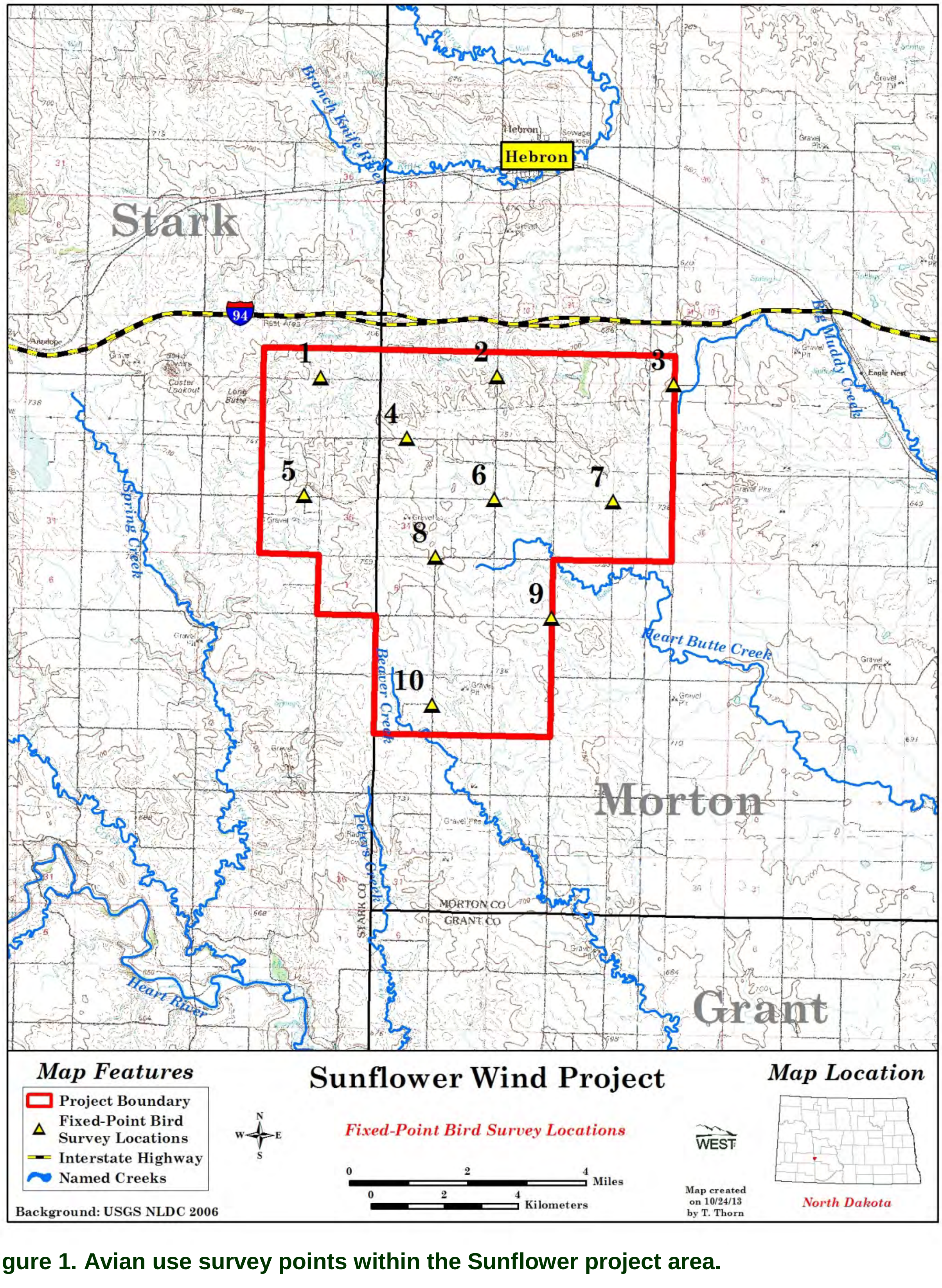

Figure 1. Avian use survey points within the Sunflower project area.

Table 1. Species observed during avian point counts within the Sunflower project area, late August 2013 through early February 2014.

Common Name	Total Observations
American Crow	1
American Goldfinch	15
American Robin	2
Bald Eagle	1
Barn Swallow	38
Black-billed Magpie	1
Brown-headed Cowbird	2
Brewer's Blackbird	30
Canada Goose	45
Clay-colored Sparrow	1
Common Grackle	10
Ferruginous Hawk	1
Golden Eagle	4
Gray Partridge	2
Greater White-fronted Goose	150
Horned Lark	216
House Sparrow	18
Killdeer	8
Lincoln's Sparrow	1
Mourning Dove	12
Northern Flicker	1
Northern Harrier	23
Rough Legged Hawk	10
Ring-necked Pheasant	102
Red-tailed Hawk	12
Rusty Blackbird	8
Red-winged Blackbird	22
Sandhill Cranes	35
Savannah Sparrow	12
Snow Bunting	97
Snow Goose	27
Sharp-tailed Grouse	26
Swainson's Hawk	10
Turkey Vulture	5
Vesper Sparrow	1
Western Meadowlark	48

WEST Inc.
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November 15, 2013

Casey Willis
Sunflower Wind Project, LLC
3760 State St., Suite 102
Santa Barbara, CA 93105

RE: Sunflower Wind Project Habitat Mapping

Dear Mr. Willis,

Vegetation types (or Habitat) were delineated using ArcGIS, ArcMap 10.1 within the Sunflower Wind Project (SFWP) and a one mile buffer (Buffer). Using 2012 USDA NAIP aerial imagery in combination with 2006 USGS NLCD land use/land cover, 2004 ND Gap land use/land cover, and 2010 and 2011 USDA NASS land classification, all land within the two areas was digitized and assigned one of seven habitat types (excluding National Wetland Inventory [NWI] wetlands; Table 1). NWI data was used to represent water within the two study areas. Those water features (mostly created stock dams and dugouts) visible on the aerial imagery but not in the NWI data were digitized as “water” habitat.

The SFWP, as described, contained slightly more than 21,980 acres and the one mile buffer contained approximately 3,000 less acres than the SFWP. Cropland and grassland made up the vast majority of land cover in both areas (96.8% of the SFWP and 93.5% of the Buffer) with cropland making up the highest percentage of both (Table 1). In descending order, the following habitat types made up the remaining area of the SFWP: developed, NWI wetlands, deciduous trees, shrubs, unknown trees, and water while the only difference in the Buffer was slightly more deciduous trees than NWI wetlands (Table 1). The percentage of each habitat type was similar between the two areas (Table 1).

Habitat types were spread out across the SFWP and Buffer (Figure 1). There was a slight predominance of larger grasslands tracts in the northern third of the SFWP and a higher amount of developed area (associated with Interstate 94) in the northern part of the Buffer (Figure 1).

Let me know if you have any questions or need further details.

Sincerely,

Clayton Derby
Senior Manager

Table 1. Digitized Land Cover within the Sunflower Wind Project and 1 mile buffer.

	SFWP		Buffer	
Habitat Type	**Acres**	**%**	**Acres**	**%**
Cropland	12,940.3	58.9	9,978.2	53.0
Grassland	8,323.8	37.9	7,619.3	40.5
Developed	485.1	2.2	967.52	5.1
NWI[a] Wetlands	110.3	0.5	104.0	0.6
Deciduous Trees	102.5	0.5	135.7	0.7
Shrubs	16.8	0.1	14.7	0.1
Unknown Trees	2.7	<0.1		
Water	1.3	<0.1	4.9	<0.1
Total	**21,982.8**		**18,824.3**	

[a] USFWS National Wetland Inventory

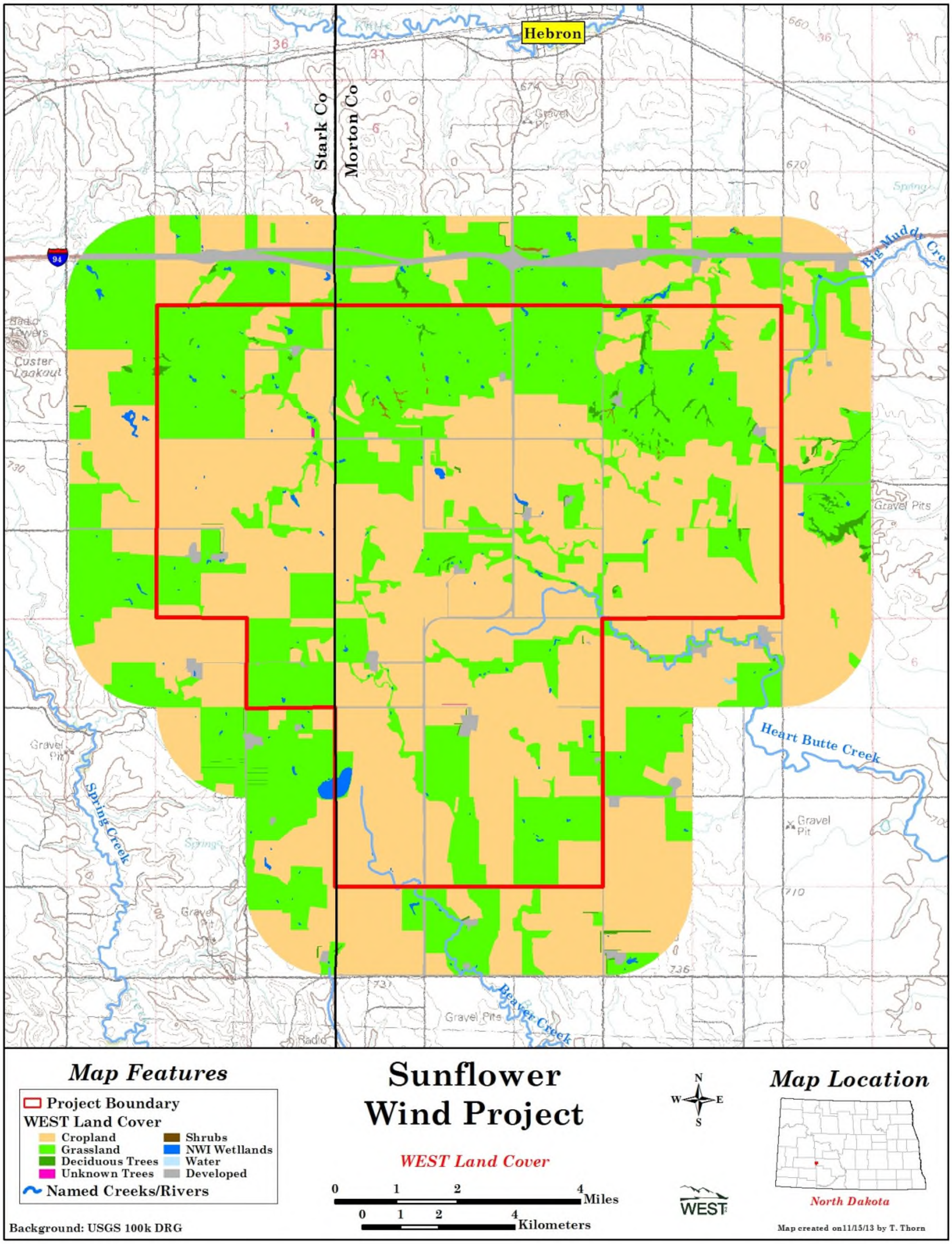

Figure 1. Digitized Land cover within the Sunflower Wind Project and 1 mile buffer.

Bat Activity Studies for the Sunflower Wind Project, Morton and Stark Counties, North Dakota

Final Report

June 2013 – October 2013

Prepared for:

Sunflower Wind Project, LLC

3760 State Street, Suite 102
Santa Barbara, California 93105

Prepared by:

Clayton Derby, Goniela Iskali, and Terri Thorn

Western EcoSystems Technology, Inc.
415 West 17th Street, Suite 200
Cheyenne, Wyoming 82001

December 10, 2013

EXECUTIVE SUMMARY

In June 2013, Western EcoSystems Technology, Inc. initiated a bat acoustic survey for the proposed Sunflower Wind Project (SWP) in Morton and Stark Counties, North Dakota. The bat acoustic survey conducted at the SWP was designed to estimate levels of bat activity within the SWP during summer and fall.

Acoustic surveys were conducted at three meteorological (met) tower stations in hay fields from June 12 through October 23, 2013. Four AnaBat™ SD2 detectors were utilized for the survey. Three acoustic monitoring stations were placed near the ground (one meter [m; 3.3 feet (ft)]) and one of these stations was paired with a detector unit with a microphone placed at approximately 45 m (147.6 ft) on the met tower using a modified bat-hat. All stations were monitored on a weekly or bi-monthly basis.

In total, AnaBat units recorded 537 bat passes in 477 detector-nights for a combined mean (± standard error) of 1.15 ± 0.12 bat passes per detector-night (Table 3). Ground detectors recorded 448 bat passes on 351 detector-nights for a mean of 1.30 ± 0.14 bat passes per detector-night, while the raised station recorded 89 bat passes on 126 detector nights for a mean of 0.71 ± 0.11 per detector-night.

Bat activity varied between seasons, with low activity in the summer and higher activity higher in the fall. Low-frequency bat pass rates peaked during late August, while high-frequency bat pass rates peaked during early August. Higher activity during the late summer and early fall may be due to the presence of both post-lactating adult female bats and newly volant juvenile bats as well as migrating bats.

For all detector locations, 54.6% of bat passes were classified as high-frequency (e.g., eastern red bats), while 45.4% of bat passes were classified as low-frequency (e.g., hoary bats and silver-haired bats).

Bat activity recorded at the SWP by ground detectors during the fall migration period (1.70 ± 0.20 bat passes per detector-night) was one of the lower call rates recorded when compared to all the facilities in the Midwest as well as compared with all facilities in North America which reported similarly-collected data.

STUDY PARTICIPANTS

Western EcoSystems Technology

Clayton Derby	Project Manager
Goniela Iskali	Bat Biologist and Report Compiler
Kimberly Bay	Data and Report Manager
Terri Thorn	GIS Technician
Andrea Palochak	Technical Editor
Cathy Clayton	Field Technician

REPORT REFERENCE

Derby, C., G. Iskali, and T. Thorn. 2013. Bat Activity Studies for the Sunflower Wind Project, Morton and Stark Counties, North Dakota. Final Report: June 2013 – October 2013. Prepared for Infinity Wind Power, Santa Barbara, California. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

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INTRODUCTION

Sunflower Wind Project, LLC (Sunflower), a wholly owned subsidiary of Infinity Wind Power, is considering the development of a wind energy facility in the Sunflower Wind Project (SWP) in Morton and Stark Counties, North Dakota. Sunflower contracted Western EcoSystems Technology, Inc. (WEST) to complete a study of bat activity following the recommendations of the US Fish and Wildlife Service's (USFWS) Land-Based Wind Energy Guidelines (WEG; USFWS 2012) based on methods outlined in Kunz et al. (2007a). WEST conducted acoustic monitoring surveys to estimate levels of bat activity within the SWP during summer and fall. The following report describes the results of acoustic monitoring surveys conducted at the SWP between June 12 and October 23, 2013.

STUDY AREA

The SWP is located in Morton and Stark Counties, North Dakota, approximately three miles (4.8 kilometers [km]) south of the town of Hebron (Figures 1 and 2). The SWP, currently about 21,983 acres (89 square kilometers [km^2]; 34 square miles [mi^2]) is located in west-central North Dakota, and more specifically western Morton and eastern Stark Counties. The landscape within the SWP is generally flat with more rolling lands in the northern third of the project area. Elevation ranges from 679 meters (m; 2,228 feet [ft]) to 817 m (2,679 ft). Historically, the SWP's landscape was dominated by grasslands but has since been converted largely to agricultural use with crop production and livestock grazing the primary practices. Trees and shrubs can be found around farmsteads, within planted shelter belts, and along/within drainages. Wetlands are scattered throughout the SWP with many being man-made.

Cultivated cropland and herbaceous/pasture/hay lands are approximately equal in amount and comprise almost 95% of the study area. Of the remaining 5%, 3.5% is developed, while wetlands, forest, and barren lands, in that order, make up the rest of the landscape (Table 1; Figure 2; USGS NLCD 2006, Fry et al. 2011). Common agricultural crops include small grains, corn (*Zea mays*), sunflowers (*Helianthus annuus*), and alfalfa (*Medicago sativa*).

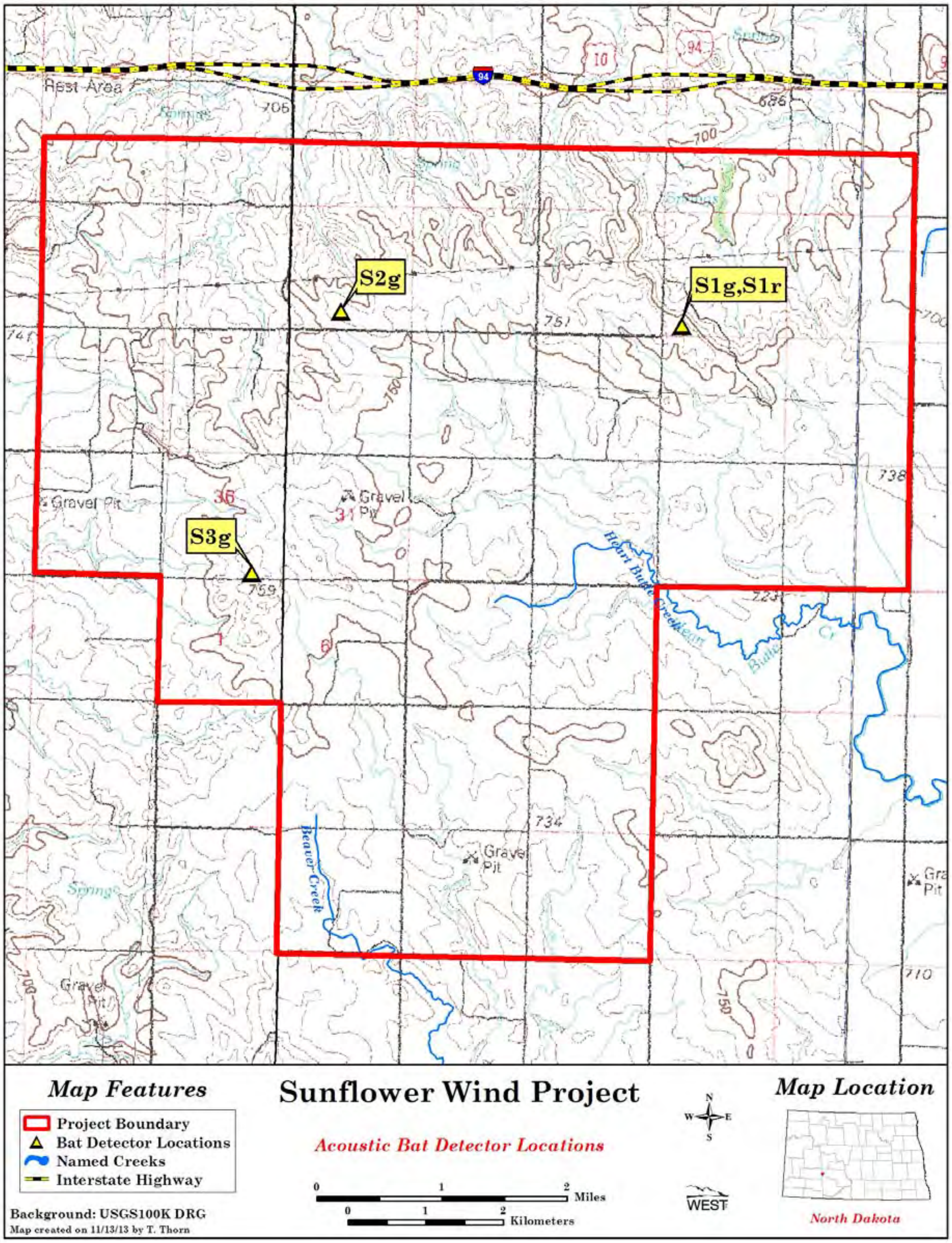

Figure 1. Topographic map showing the location of the Sunflower Wind Project and AnaBat stations.

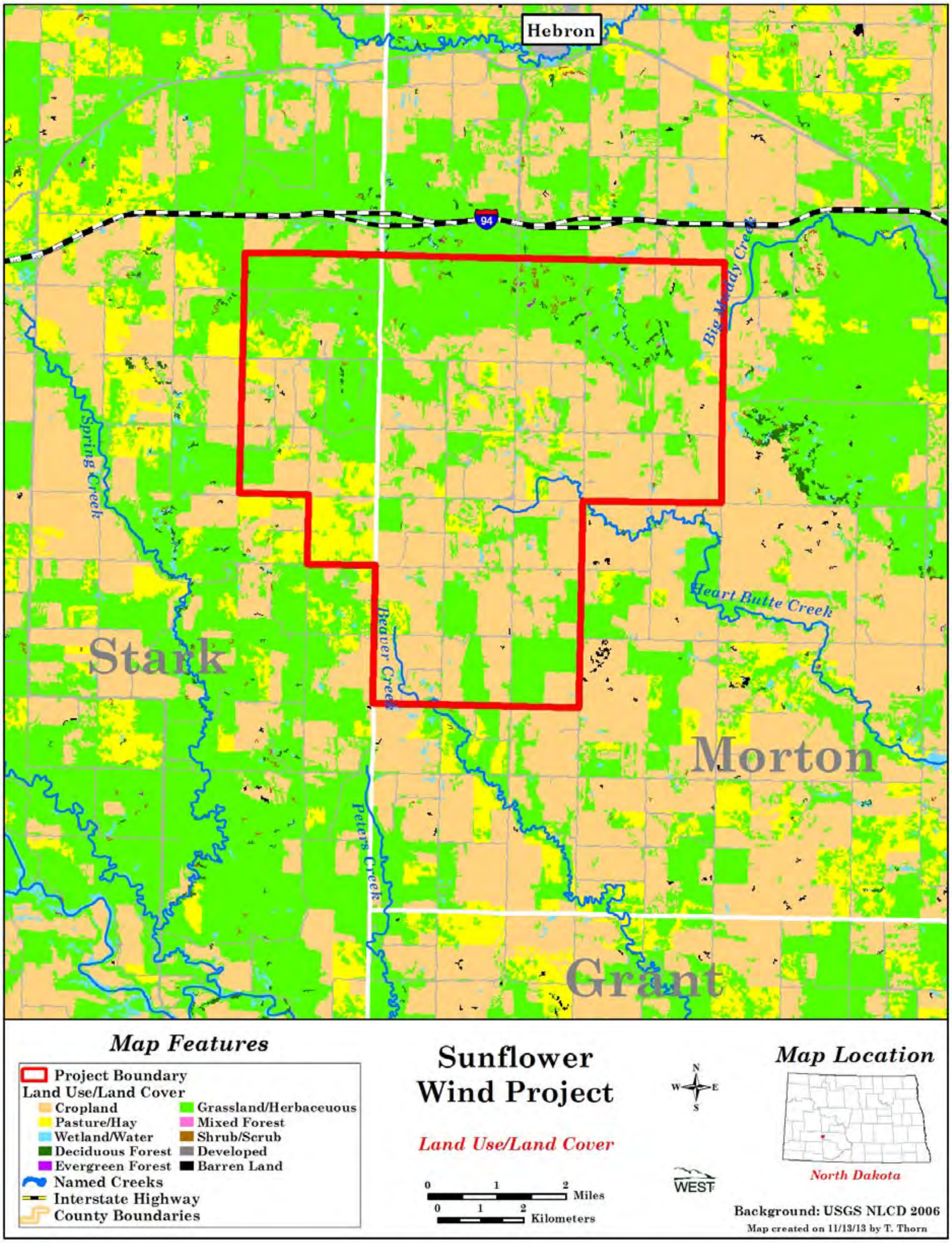

Figure 2. Land cover in the Sunflower Wind Project (USGS NLCD 2006).

Table 1. Land cover in the Sunflower Wind Project according to the United States Geological Survey National Land Cover Dataset (USGS NLCD 2006).

Land Cover	Acres	% Composition
Cultivated Crops	10,493.79	47.74
Grassland/Herbaceous	8,965.43	40.78
Pasture/Hay	1,394.77	6.34
Developed, Open Space	703.38	3.20
Woody Wetlands	110.59	0.50
Deciduous Forest	100.58	0.46
Shrub/Scrub	62.75	0.29
Developed, Low Intensity	58.52	0.27
Emergent Herbaceous Wetland	46.51	0.21
Open Water	30.93	0.14
Barren Land (rock/sand/clay)	8.23	0.04
Evergreen Forest	4.45	0.02
Mixed Forest	3.34	0.02
Total	**21,983.27**	**100**

Overview of Bat Diversity

Ten species of bats may potentially occur in North Dakota and in the SWP (Table 2). One of these, the northern long-eared bat, is a sensitive species that was recently proposed to be listed as endangered by the USFWS (2013). The northern long-eared bat, along with several once common and abundant bat species such as the little brown bat (*Myotis lucifugus*) are experiencing population declines due to the spread of white-nose syndrome (Frick et al. 2010; Center for Biological Diversity 2010). The northern long-eared bat uses caves and underground mines for hibernation. There are no karst regions or mines within the SWP for hibernation. The nearest karst region is approximately 130 miles from SWP and located in southeastern Montana (USGS 2013). During the summer, it relies upon forested habitat and it roosts in tree cavities and underneath exfoliating bark (BCI 2013) and forages over open water areas within and near forested areas. There are limited trees within the SWP (Figure 2); the closest area of denser tree growth around water is the Heart River, approximately 8 miles south of the SWP.

Table 2. Bat species with potential to occur within the Sunflower Wind Project (Harvey et al. 1999, BCI 2003) categorized by echolocation call frequency.

Common Name	Scientific Name
High-Frequency (> 30 kHz)	
eastern red bat[1,3]	*Lasiurus borealis*
western small-footed bat	*Myotis ciliolabrum*
little brown bat[1]	*Myotis lucifugus*
western long-eared bat[1]	*Myotis evotis*
northern long-eared bat[1,2]	*Myotis septentrionalis*
long-legged bat[1]	*Myotis volans*
Low-Frequency (< 30 kHz)	
big brown bat[1]	*Eptesicus fuscus*
hoary bat[1,3]	*Lasiurus cinereus*
silver-haired bat[1,3]	*Lasionycteris noctivagans*
fringed bat	*Myotis thysanodes*

[1] species known to have been killed at wind energy facilities (Species reported by Anderson et al. 2004, Kunz et al. 2007b, Baerwald 2008);
[2] proposed for listing as a federally endangered species (USFWS 2013); and
[3] long-distance migrant.

METHODS

Bat Acoustic Surveys

WEST conducted acoustic monitoring studies to estimate levels of bat activity throughout the SWP during summer and fall. Bat detectors are a primary acoustic survey tool used in baseline wind development surveys to calculate an index of bat activity; the levels of bat activity provide some insight into possible impacts of development on bats (Arnett 2007, Kunz et al. 2007a).

Survey Stations

Four AnaBat™ SD2 ultrasonic bat detectors (Titley Scientific™, Australia) were used during the study. Two AnaBat SD2 detectors were paired at one of the meteorological (met) towers, with one detector at ground level approximately 1 m (3.3 ft) above ground level (AGL) and another approximately 45 m (148 ft) AGL (Figure 1). The other two AnaBat units (ground level) were placed at two other met tower locations (Figure 1). Species activity levels and composition can vary with altitude (Baerwald and Barclay 2009, Collins and Jones 2009), so it is important to monitor at different heights (Kunz et al. 2007b). Ground-based detectors likely detect a more complete sample of the bat species present within the project area, whereas elevated detectors may give a more accurate assessment of risk to bat species flying at rotor swept heights (Kunz et al. 2007b).

Each AnaBat unit was inside a plastic weather-resistant container that had a hole cut in the side through which the microphone extended. Each microphone was encased in a 45-degree angle poly-vinyl chloride (PVC) tube, and holes were drilled in the PVC tube to allow water to drain. Raised AnaBat microphones were elevated on met towers using a pulley system. Bat-Hat weatherproof housing (EME Systems, Berkeley California) was modified by replacing the Plexiglas reflector plate with a 45-degree angle PVC elbow. The Bat-Hat was altered because detectors protected using un-modified Bat-Hats may detect lower activity and species richness than are present at a site, while detectors protected with a 45-degree PVC elbow have been found to detect similar numbers and quality of bat calls as detectors exposed to the environment (Britzke et al. 2010).

Survey Schedule

Bats were surveyed at the SWP from June 12 to October 23, 2013, and units were programmed to turn on approximately 30 minutes (min) before sunset and turn off approximately 30 min after sunrise each night.

Data Collection and Call Analysis

AnaBat detectors use a broadband high-frequency microphone to detect the echolocation calls of bats. Incoming echolocation calls are digitally processed and stored by the detector. Incoming echolocation calls are digitally processed and stored on a high capacity compact flash card. The resulting files can be viewed in appropriate software (i.e., Analook©) as digital sonograms that show changes in echolocation call frequency over time. Frequency versus time displays were used to separate bat calls from other types of ultrasonic noise (e.g., wind, insects, etc.) and to identify the call frequency classification and (when possible) the species of bat that generated the calls.

The detection range of AnaBat detectors depends on a number of factors (e.g., echolocation call characteristics, microphone sensitivity, habitat, the orientation of the bat, atmospheric conditions; Limpens and McCracken 2004), but is generally less than 30 m (98 ft) due to atmospheric absorption of echolocation pulses (Fenton 1991). To standardize acoustic sampling effort across the project, AnaBat units were calibrated and sensitivity levels were set to six (Larson and Hayes 2000), a level that balanced the goal of recording bat calls against the need to reduce interference from other sources of ultrasonic noise (Brooks and Ford 2005).

For each survey location, bat passes were sorted by their minimum frequency into two groups based on their minimum frequency that correspond roughly to species groups of interest. For example, most species of *Myotis* bats, as well as eastern red bats (*Lasiurus borealis*), echolocate at frequencies greater than 30 kilohertz (kHz), and are considered high-frequency bats (HF), whereas species such as the big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*) typically emit echolocation calls below 30 kHz and are considered low-frequency bats. To establish which species may have produced passes in each category, a list of species expected to occur in the study area was compiled from range maps (Table 2; BCI 2003).

Statistical Analysis

The standard metric used for measuring bat activity was the number of bat passes per detector-night, and this metric was used as an index of bat activity in the project area. A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat with no pause between calls of more than one second (White and Gehrt 2001, Gannon et al. 2003). A detector-night was defined as one detector operating for one entire night. The terms bat pass and bat call are used interchangeably. Bat passes per detector-night was calculated for all bats, and for HF and LF categories. Bat pass rates represent indices of bat activity and do not represent numbers of individuals. The number of bat passes was determined by an experienced bat acoustic analyst using Analook. All multi-detector averages in this report were calculated by averaging the average activity of each detector.

The period of peak sustained bat activity was defined as the 7-day period with the highest average bat activity. If multiple 7-day periods equaled the peak sustained bat activity rate, all dates in these 7-day periods were reported. This and all multi-detector averages in this report were calculated as an un-weighted average of total activity at each detector.

To highlight seasonal activity patterns, the study was divided into two survey periods: summer (June 13 – July 31), and fall (August 1 – October 23). Mean bat activity was also calculated for a standardized fall migration period (FMP), defined here as July 30 – October 14. The FMP represents the period between dissolution of maternity colonies and onset of the swarming and hibernation seasons. This period was defined by WEST as a standard for comparison with activity from other wind energy facilities. During this time bats begin moving toward wintering areas, and many species of bats initiate reproductive behaviors (Cryan 2008). This period of increased landscape-scale movement and reproductive behavior is often associated with increased levels of bat fatalities at operational wind energy facilities (Arnett et al. 2008).

Risk Assessment

To assess potential for bat fatalities, bat activity in the SWP was compared to existing data at other wind energy facilities in the Midwest. Among studies measuring both activity and fatality rates, most data were collected during the fall using AnaBat detectors placed at ground level near met towers. Therefore, to make valid comparisons to the publically available data, this report uses the activity rate recorded at ground detectors during the FMP as a standard for comparison with activity data from other wind energy facilities. Given the relatively small number of publicly-available studies and the significant ecological differences between geographically dispersed facilities, the risk assessment is qualitative, rather than quantitative.

RESULTS

Bat Acoustic Surveys

Bat activity was monitored at the three sampling locations between June 12 and October 23, 2013, resulting in a total of 477 detector-nights (89.7% of the potential sampling period; Figure 3). The primary causes of lost data were weather related when excessive wind knocked down two of the AnaBat detectors, and battery failure. AnaBat units at fixed ground stations recorded 448 bat passes on 351 detector-nights for a mean (± standard error) of 1.30 ± 0.14 bat passes per detector-night, while the raised station recorded 89 bat passes on 126 detector nights for a mean of 0.71 ± 0.11 per detector-night (Table 3, Figure 4). In total, AnaBat units recorded 537 bat passes on 477 detector-nights for a mean of 1.15±0.12 bat passes per detector-night (Table

3). In addition, excessive noise was detected for about three weeks from August 13 to September 3, 2013, likely due to bee hives that were installed near station S3g (Figure 5).

Spatial Variation

Bat activity in the SWP was consistently higher at the ground units (Figure 4, Table 3). On average, activity at ground detectors (1.30 ± 0.14) was nearly twice as high as at the raised detector (0.71 ± 0.11; Table 3, Figures 4 and 6). Bat activity varied between the four met tower locations. Among ground units, S3G recorded the fewest bat passes per detector-night (0.88 ± 0.17), while unit S1G recorded the most (1.65 ± 0.19; Table 3, Figure 4).

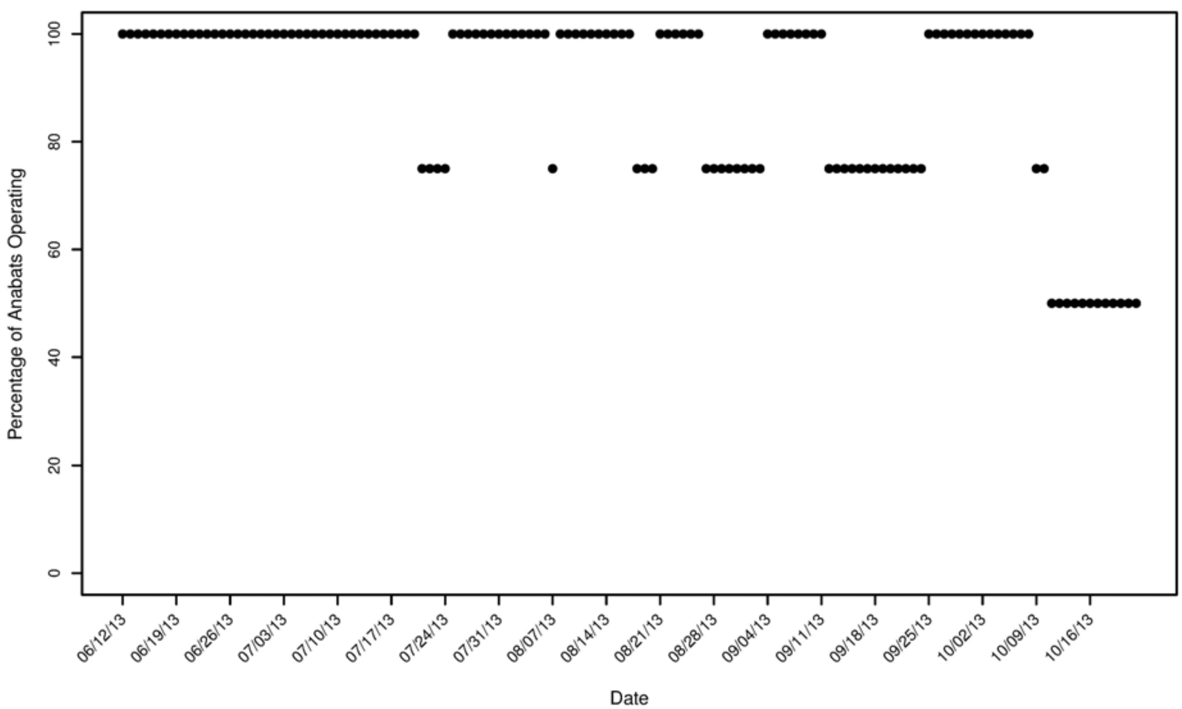

Figure 3. Operational status of AnaBat detectors operating at the Sunflower Wind Project during each night of the study period June 12 to October 23, 2013.

Table 3. Results of acoustic bat surveys conducted at fixed stations within the Sunflower Wind Project from June 12 to October 23, 2013. Passes are separated by call frequency: high frequency (HF) and low frequency (LF).

AnaBat Station	Location	# of HF Bat Passes	# of LF Bat Passes	Total Bat Passes	Detector-Nights	Bat Passes/ Night*
S1G	ground	105	81	186	113	1.65±0.19
S1R	raised	15	74	89	126	0.71±0.10
S2G	ground	90	56	146	106	1.38±0.18
S3G	ground	83	33	116	132	0.88±0.17
Total Ground		278	170	448	351	1.30±0.14
Total Raised		15	74	89	126	0.71±0.11
Total		293	244	537	477	1.15±0.12

* ± bootstrapped standard error.

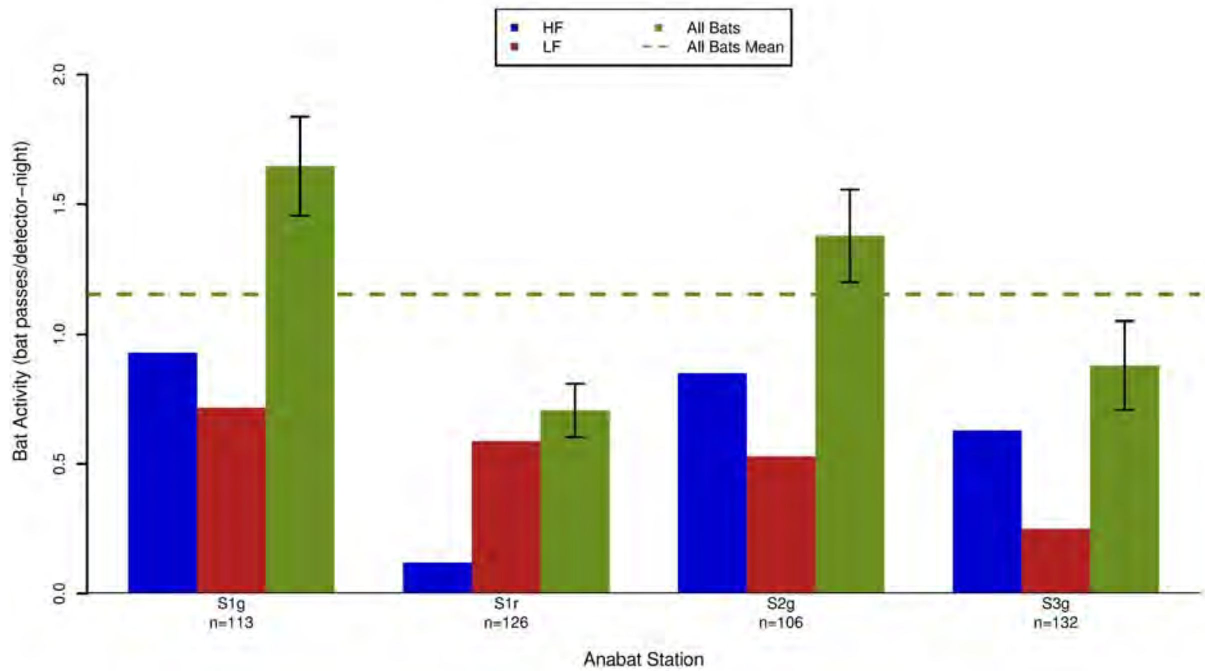

Figure 4. Number of high-frequency (HF) and low-frequency (LF) bat passes per detector-night recorded at AnaBat stations in the Sunflower Wind Project between June 12 to October 23, 2013. The bootstrapped standard errors are represented by the black error bars on the 'All Bats' columns.

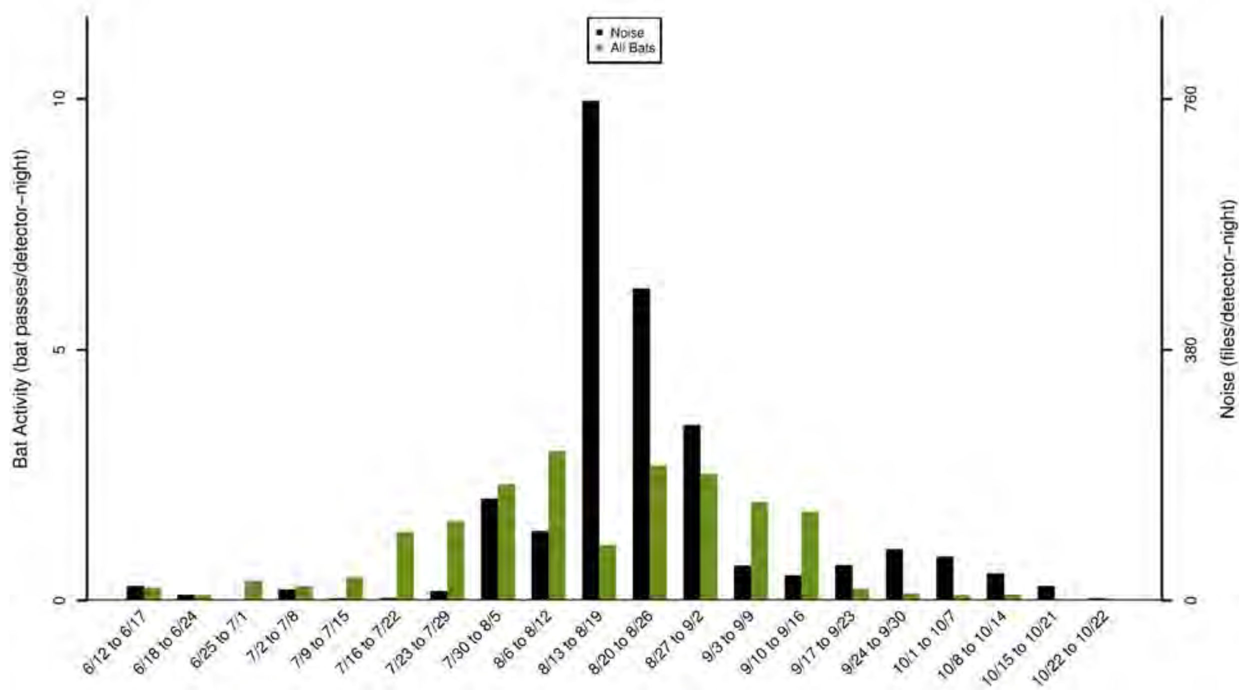

Figure 5. Activity and noise comparison at fixed AnaBat stations for all bats in the Sunflower Wind Project from June 12 to October 23, 2013.

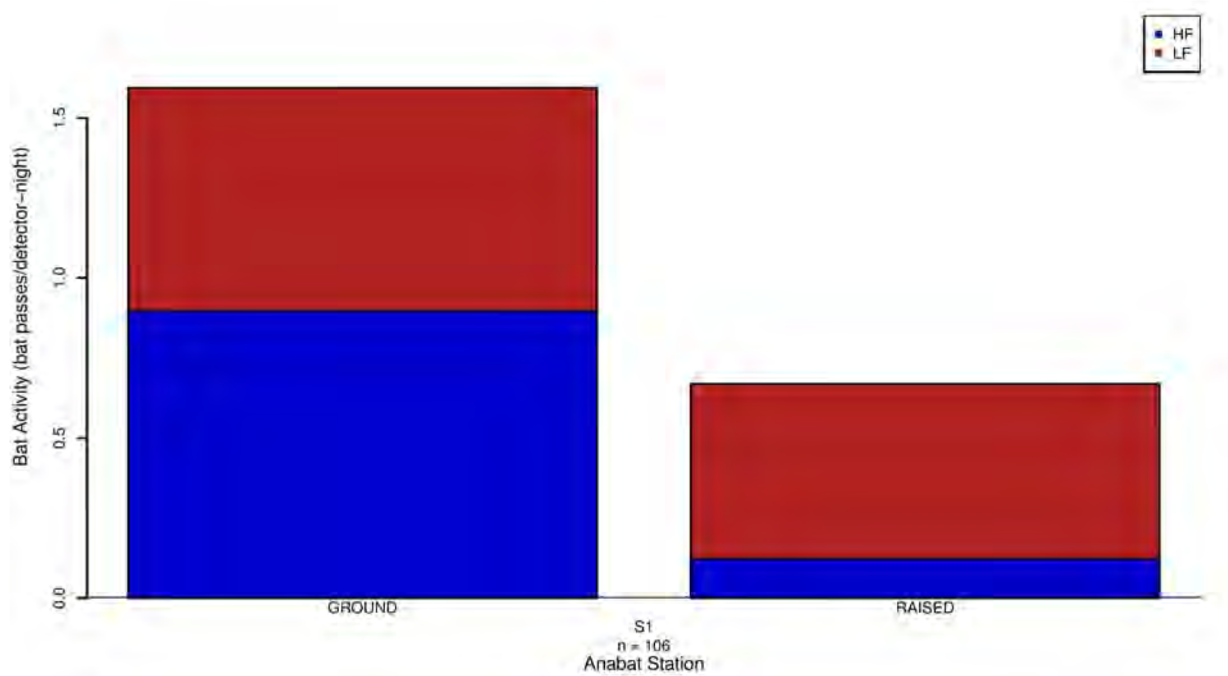

Figure 6. Number of high-frequency (HF) and low-frequency (LF) bat passes per detector-night recorded at the paired AnaBat station (S1) between June 12 to October 23, 2013.

Temporal Variation

Bat activity at fixed stations was relatively low in the summer and higher in the fall (Table 4; Figure 7). Bat activity peaked from August 4 to August 10 at 3.35 bat passes per detector-night (Table 5). After the peak, overall bat activity gradually decreased for the remainder of the study period (Figure 8). Comparing weekly activity at paired ground and raised detectors indicates a subtle shift during the course of the season; activity was generally higher at ground detectors throughout the summer and fall, but LF calls were higher at the raised station during the fall and FMP (Table 4; Figure 9).

Table 4. The number of bat passes per detector-night recorded at met towers stations in the Sunflower Wind Project during each season in 2013, separated by call frequency: high-frequency (HF), low-frequency (LF), and all bats (AB).

Station	Call Frequency	Summer June 12 – Jul 31	Fall Aug 1 – Oct 23	Fall Migration Jul 30 – Oct 14
S1g	LF	0.38	0.98	1.00
	HF	0.66	1.14	1.14
	AB	1.04	2.13	2.14
S1r	LF	0.13	0.85	0.93
	HF	0.09	0.14	0.18
	AB	0.22	0.99	1.11
S2g	LF	0.18	0.84	0.83
	HF	0.74	0.95	0.95
	AB	0.92	1.79	1.78

Table 4. The number of bat passes per detector-night recorded at met towers stations in the Sunflower Wind Project during each season in 2013, separated by call frequency: high-frequency (HF), low-frequency (LF), and all bats (AB).

Station	Call Frequency	Summer June 12 – Jul 31	Fall Aug 1 – Oct 23	Fall Migration Jul 30 – Oct 14
S3g	LF	0.06	0.37	0.39
	HF	0.56	0.67	0.8
	AB	0.62	1.04	1.2
Ground Totals	**LF**	0.21±0.06	0.73±0.11	0.74±0.11
	HF	0.65±0.12	0.92±0.13	0.96±0.13
	AB	0.86±0.16	1.65±0.20	1.70±0.20
Raised Totals	**LF**	0.13±0.06	0.85±0.16	0.93±0.17
	HF	0.09±0.05	0.14±0.04	0.18±0.05
	AB	0.22±0.09	0.99±0.18	1.11±0.19
Overall	**LF**	0.19±0.04	0.76±0.11	0.79±0.11
	HF	0.51±0.09	0.72±0.10	0.77±0.10
	AB	0.70±0.12	1.48±0.18	1.55±0.18

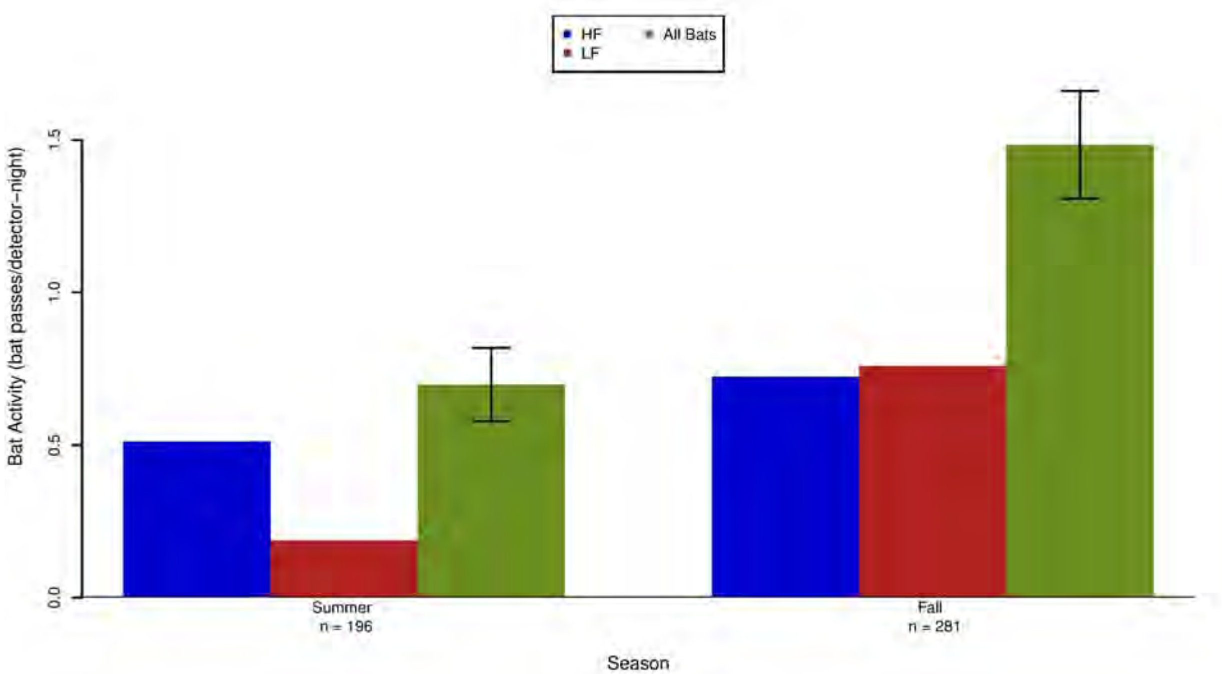

Figure 7. Seasonal bat activity by high-frequency (HF), low-frequency (LF), and all bats at the Sunflower Wind Project from June 12 to October 23, 2013. The bootstrapped standard errors are represented by black bars on the 'All Bats' columns.

Table 5. Periods of peak activity for high-frequency (HF), low-frequency (LF), and all bats at the Sunflower Wind Project for the study period June 12 – October 23, 2013.

Species Group	Start Date of Peak Activity	End Date of Peak Activity	Bat Passes per Detector-Night
HF	August 4	August 10	2.10
LF	August 27	September 04	1.76
All Bats	August 4	August 10	3.35

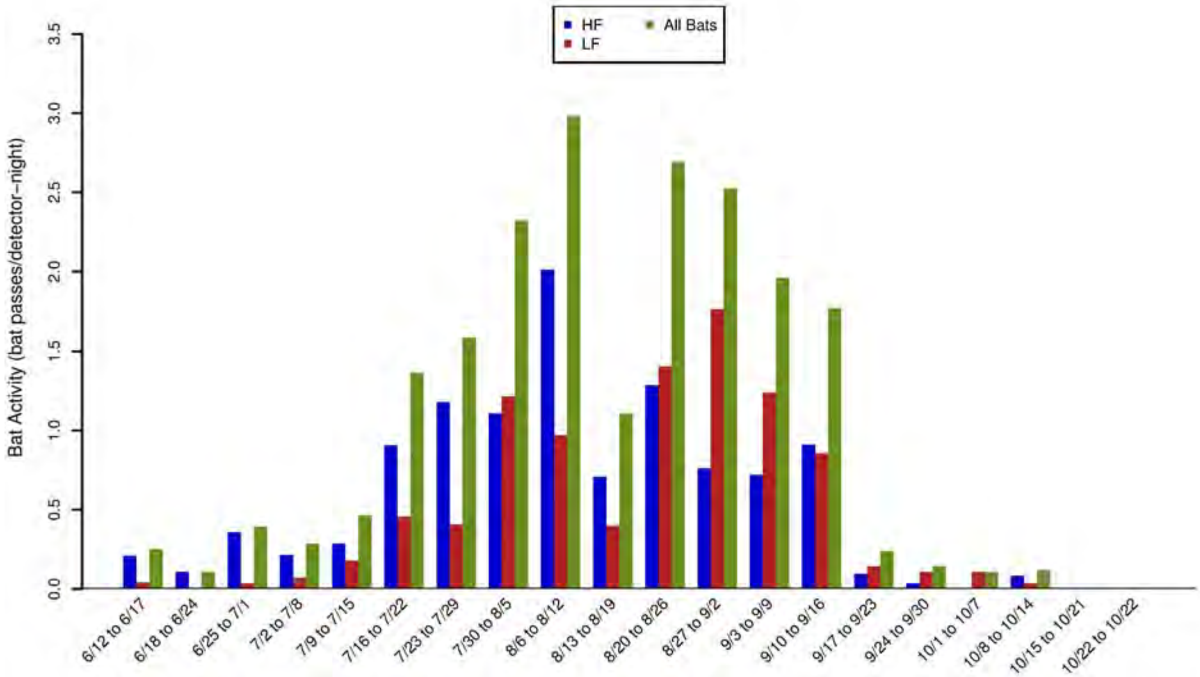

Figure 8. Weekly patterns of bat activity by high-frequency (HF), low-frequency (LF), and all bats at the Sunflower Wind Project for the study period June 12 to October 23, 2013.

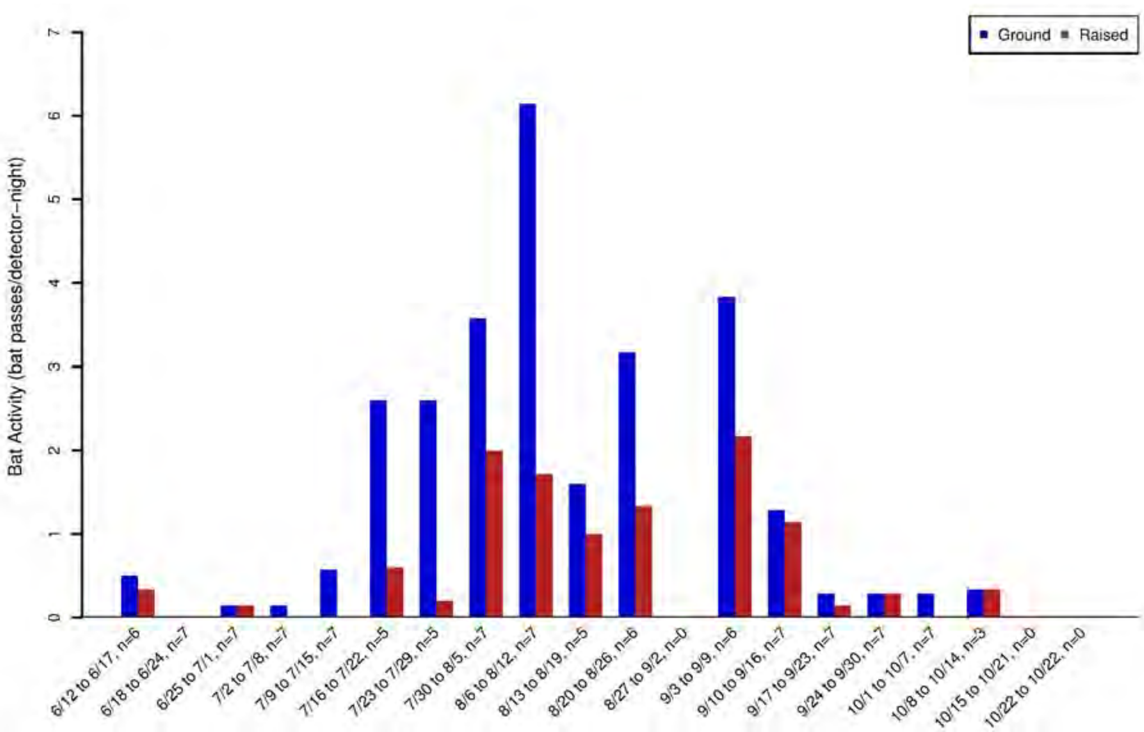

Figure 9. Weekly patterns of bat activity from June 12 to October 23, 2013, at ground and raised met tower stations at the Sunflower Wind Project.

DISCUSSION

Potential Bat Impacts

Assessing the potential impacts of wind energy development on bats at the SWP is complicated because the causes of bat fatalities at turbines are poorly understood (Kunz et al. 2007a, 2007b; Baerwald et al. 2008; Cryan and Barclay 2009; Long et al. 2010a, 2010b) and monitoring elusive, night-flying animals is inherently difficult (O'Shea et al. 2003). Although installed capacity for wind energy has increased rapidly in recent years, release of study results from these existing wind energy facilities has lagged the influx of newly proposed facilities (Kunz et al. 2007b); therefore, it is often the case that information gleaned from existing wind energy facilities is not available to inform assessments at proposed facilities. To date, post-construction monitoring studies of wind energy facilities suggest that:

1) Bat fatality rates show a rough positive correlation with bat activity (Kunz et al. 2007b);

2) The majority of fatalities occur during the post-breeding or fall migration season (August and September; Johnson 2005, Arnett et al. 2008);

3) Migratory tree-roosting species (e.g., eastern red, hoary, and silver-haired bats) compose approximately 75% of reported bats killed (Arnett et al. 2008, Gruver et al. 2009), and;

4) The level of bat fatalities may depend on many variables, including local environmental characteristics and/or specific weather conditions, but no single predictive factor has yet been identified.

Overall Bat Activity

Among publicly-available studies of bat activity at wind energy facilities, most data were collected only during the fall using AnaBat detectors placed near the ground in vegetation cover typical of turbine placement, rather than near features attractive to bats. Therefore, to generate a standardized metric of activity for comparison, this report relies on mean bat activity for the ground detectors during the fall migration period (FMP) to compare activity at the SWP to other studies with similarly-collected data (Figure 10, Appendix A).

While inconsistencies among studies (e.g., differences in study period length and timing, type of equipment, placement of equipment, and presentation of data; Appendix A) complicate comparisons across studies, some generalizations can be made. Considering only the detectors near ground-level at the met towers, bat activity recorded within the SWP during the standardized FMP (1.70 bat passes per detector-night) was the lowest estimate out of all the facilities in Midwest and the third lowest out of all the facilities in North America with similarly-collected data (Appendix A). However, this includes estimates from facilities in different regions, with different habitats and different bat species.

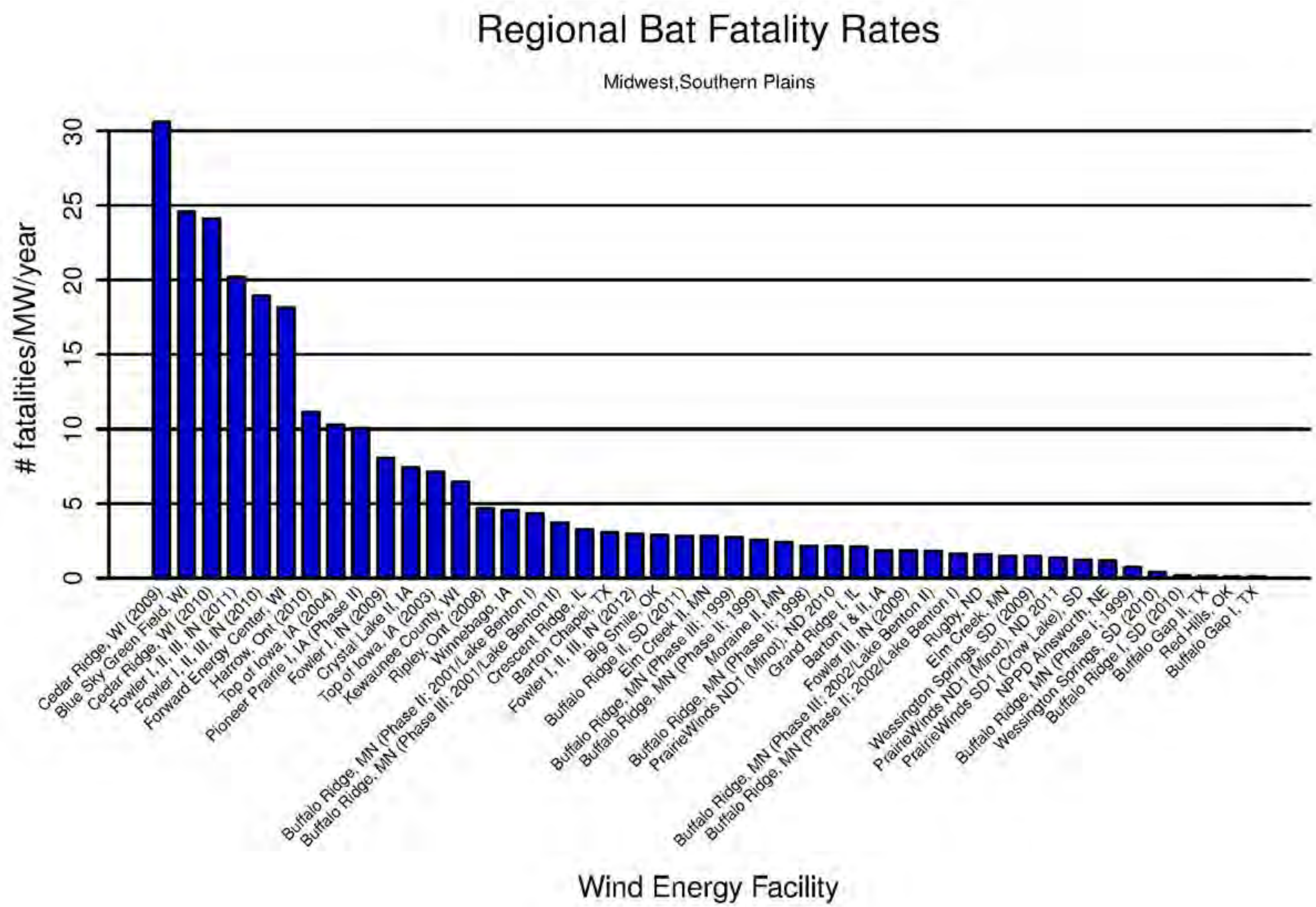

Figure 10. Fatality rates for bats (number of bats per megawatt per year) from publicly-available studies at wind energy facilities in the Midwest and Southern Plains of North America.

Figure 10 (*continued*). Fatality rates for bats (number of bats per megawatt per year) from publicly-available studies at wind energy facilities in the Midwest and Southern Plains of North America.

Data from the following sources:

Wind Energy Facility	Reference	Wind Energy Facility	Reference	Wind Energy Facility	Reference
Cedar Ridge, WI (09)	BHE Environmental 2010	Buffalo Ridge, MN (Ph. II; 01/Lake Benton I)	Johnson et al. 2004	Fowler III, IN (09)	Good et al. 2011
Blue Sky Green Field, WI	Gruver et al. 2009	Buffalo Ridge, MN (Ph. III; 01/Lake Benton II)	Johnson et al. 2004	Buffalo Ridge, MN (Ph. III; 02/Lake Benton II)	Johnson et al. 2004
Cedar Ridge, WI (10)	BHE Environmental 2011	Crescent Ridge, IL	Kerlinger et al. 2007	Buffalo Ridge, MN (Ph. II; 02/Lake Benton I)	Johnson et al. 2004
Fowler I, II, III, IN (11)	Good et al. 2012	Barton Chapel, TX	WEST 2011	Rugby, ND	Derby et al. 2011b
Fowler I, II, III, IN (10)	Good et al. 2011	Fowler I, II, III, IN (12)	Good et al. 2013	Elm Creek, MN	Derby et al. 2010c
Forward Energy Center, WI	Grodsky and Drake 2011	Big Smile, OK	Derby et al. 2013a	Wessington Springs, SD (09)	Derby et al. 2010f
Harrow, Ont. (10)	NRSI 2011	Buffalo Ridge II, SD (11)	Derby et al. 2012a	PrairieWinds ND1 (Minot), ND (11)	Derby et al. 2012c
Top of Iowa, IA (04)	Jain 2005	Elm Creek II, MN	Derby et al. 2012b	PrairieWinds SD1 (Crow Lake), SD	Derby et al. 2012d
Pioneer Prairie, IA (Ph. II)	Chodachek et al. 2012	Buffalo Ridge, MN (Ph. III; 99)	Johnson et al. 2000	NPPD Ainsworth, NE	Derby et al. 2007
Fowler I, IN (09)	Good et al. 2011	Buffalo Ridge, MN (Ph. II; 99)	Johnson et al. 2000	Buffalo Ridge, MN (Ph. I; 99)	Johnson et al. 2000
Crystal Lake II, IA	Derby et al. 2010a	Moraine II, MN	Derby et al. 2010d	Wessington Springs, SD (10)	Derby et al. 2011d
Top of Iowa, IA (03)	Jain 2005	Buffalo Ridge, MN (Ph. II; 98)	Johnson et al. 2000	Buffalo Ridge I, SD (10)	Derby et al. 2010b
Kewaunee County, WI	Howe et al. 2002	PrairieWinds ND1 (Minot), ND (10)	Derby et al. 2011c	Buffalo Gap II, TX	Tierney 2009
Ripley, Ont (08)	Jacques Whitford 2009	Grand Ridge I, IL	Derby et al. 2010g	Red Hills, OK	Derby et al. 2013b
Winnebago, IA	Derby et al. 2010e	Barton I & II, IA	Derby et al. 2011a	Buffalo Gap I, TX	Tierney 2007

It is unclear whether monitoring bat activity near ground level accurately represents activity at all heights (Hayes and Gruver 2000). Some research suggests that bat activity in the rotor-swept heights may be more representative of bat exposure to turbines (Baerwald and Barclay 2009). At the SWP, fall bat migration activity recorded by the 45 m detector (1.11 bat passes per detector-night; Table 4) was lower than at the 1 m detectors (1.70 bat passes per night). While bat activity at 45 m (148 ft) detectors might better represent activity in the rotor-swept height (RSH), it is not directly comparable to activity rates reported at other North American studies.

Spatial Variation

Detection rates at the ground detectors varied between met towers; however, the raised unit consistently recorded approximately half the number of bat calls as the corresponding ground detectors. The met towers were located in hay fields and represent potential turbine locations. Because bat activity was generally lower at the raised met tower station than ground level stations, there may a lower potential risk of collision with turbines than if the call rates were similar at both the ground and at the raised station.

Temporal Variation

The highest bat activity occurred within the SWP during the fall, with peak activity in early August (Table 5). Higher activity in early August likely corresponds with the reproductive seasons of bats, when pups are being weaned and foraging rates are high among adult females and newly volant juveniles as well as fall migration. When data collection for this report ended on October 23, 2013, there was a consistent trend of decreasing bat activity from previous weeks, indicating that additional peaks in bat activity after October 23 are unlikely (Figures 8 and 9).

Most bat fatality studies at wind energy facilities in the US have shown a peak in fatality in August and September (the fall migration period) and generally lower mortality earlier in the summer and very low mortality during the spring (Johnson 2005, Arnett et al. 2008). While the survey effort varied among the different studies, a general association between the timing of increased bat call rates and timing of mortality was suggested in the studies that combine AnaBat and fatality surveys, with both call rates and fatalities peaking during the FMP. Based on the available data, it is expected that bat fatalities at the SWP, while likely low overall, will be highest during late summer and early fall at potential turbine locations (i.e., met towers).

Species Composition

Eight of the ten bat species likely to occur in the SWP are known fatalities at wind energy facilities (Table 2). Approximately 54.6% of passes recorded at all met tower stations were by high-frequency bats, suggesting higher relative abundance of species such as eastern red bats and little brown bats as well as other potential species *(*Table 2). Met tower stations represent potential turbine locations and it is expected that bat species flying at RSH and detected at raised stations are the most vulnerable to collision with turbine blades. In some regions, eastern red bats compose the majority of bat fatalities found during searches (Arnett et al. 2008).

Low-frequency bats (e.g., hoary bat, silver-haired bat, and big brown bat) were the most common frequency group detected at the raised station during the fall and FMP (Table 4). Some LF species, such as hoary bat and silver-haired bat, have been found as fatalities in higher proportions than other species (Arnett et al. 2008). High-frequency species (e.g., eastern red bats and most *Myotis* species) were detected at the raised station less frequently (16.8% of calls; Table 3). Some HF bat carcasses (e.g., little brown bat) have been found in relatively high proportions during fatality monitoring studies (e.g., Kerns and Kerlinger 2004, Jain 2005, Brown and Hamilton 2006b, Gruver et al. 2009). However, *Myotis* species are typically less commonly recorded in the RSH or as fatalities at post-construction studies at wind energy facilities than other species, such as hoary and eastern red bats (Kunz et al. 2007b, Arnett et al. 2008).

Potential Bat Fatality Rates

Bat fatality rates from studies at wind energy facilities across North America have ranged from 0.08 (Chatfield et al. 2012) to 39.70 bat fatalities/MW/year (Fiedler et al. 2007; Appendix A). In general, fatality rates exhibit a high degree of variation for most regions. Thus far, bat fatality rates at wind energy facilities located in agricultural regions of the Dakotas, Illinois, Indiana, Iowa, Minnesota, Wisconsin, and Ontario have ranged from 0.16 to 30.61 bats/MW/year (Appendix A). The reports of moderate to high levels of bat fatalities in agricultural settings in Iowa (Jain 2005, Chodachek et al. 2012); Ontario, Canada (Natural Resource Solutions, Inc. [NRSI] 2011); and Wisconsin (Gruver et al. 2009; BHE Environmental 2010, 2011) suggest that the lack of forested areas does not guarantee low bat fatality rates at wind energy facilities.

Bat activity recorded at the SWP by ground detectors at met towers during the FMP (1.70 ± 0.20 bat passes per detector-night) was the lowest activity when compared to all publicly-available reports from facilities in Midwest and the third lowest when compared to all facilities in North America with similarly-collected activity data (Appendix A), potentially indicating low direct impacts to bats. However, the efficacy of using pre-construction bat activity surveys to predict post-construction fatality rates is unclear. This may be due to a lack of consistent methodologies between projects. Some bat species may also be attracted to turbines out of curiosity, or for mating, foraging, or roosting opportunities (Cryan and Barclay 2009). These two factors further complicate the interpretation of existing data. The pre-construction bat studies completed at the SWP will add to the growing body of research regarding the impacts of wind energy development on bats and will provide a valuable comparison to post-construction studies to be completed at the SWP.

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Appendix A. North American Fatality Summary Tables

Appendix A1. Wind energy facilities in North America with comparable activity and fatality data for bats, separated by geographic region.

Wind Energy Facility	Bat Activity Estimate[A]	Bat Activity Dates	Fatality Estimate[B]	No. of Turbines	Total MW
Sunflower, ND	**1.70**				
	Midwest				
Cedar Ridge, WI (2009)	9.97[C,D,E,F]	7/16/07-9/30/07	30.61	41	67.6
Blue Sky Green Field, WI	7.7[F]	7/24/07-10/29/07	24.57	88	145
Cedar Ridge, WI (2010)	9.97[C,D,E,F]	7/16/07-9/30/07	24.12	41	68
Fowler I, II, III, IN (2011)			20.19	355	600
Fowler I, II, III, IN (2010)			18.96	355	600
Forward Energy Center, WI	6.97	8/5/08-11/08/08	18.17	86	129
Harrow, Ont (2010)			11.13	24 (four 6-turb facilities)	39.6
Top of Iowa, IA (2004)	35.7	5/26/04-9/24/04	10.27	89	80
Pioneer Prairie I, IA (Phase II)			10.06	62	102.3
Fowler I, IN (2009)			8.09	162	301
Crystal Lake II, IA			7.42	80	200
Top of Iowa, IA (2003)			7.16	89	80
Kewaunee County, WI			6.45	31	20.46
Ripley, Ont (2008)			4.67	38	76
Winnebago, IA			4.54	10	20
Buffalo Ridge, MN (Phase II; 2001/Lake Benton I)	2.2[D]	6/15/01-9/15/01	4.35	143	107.25
Buffalo Ridge, MN (Phase III; 2001/Lake Benton II)	2.2[D]	6/15/01-9/15/01	3.71	138	103.5
Crescent Ridge, IL			3.27	33	49.5
Fowler I, II, III, IN (2012)			2.96	355	600
Elm Creek II, MN			2.81	62	148.8
Buffalo Ridge II, SD (2011)			2.81	105	210
Buffalo Ridge, MN (Phase III; 1999)			2.72	138	103.5
Buffalo Ridge, MN (Phase II; 1999)			2.59	143	107.25
Moraine II, MN			2.42	33	49.5
Buffalo Ridge, MN (Phase II; 1998)			2.16	143	107.25
PrairieWinds ND1 (Minot), ND 2010			2.13	80	115.5
Grand Ridge I, IL			2.10	66	99
Barton I & II, IA			1.85	80	160
Fowler III, IN (2009)			1.84	60	99
Buffalo Ridge, MN (Phase III; 2002/Lake Benton II)	1.9[D]	6/15/02-9/15/02	1.81	138	103.5
Buffalo Ridge, MN (Phase II; 2002/Lake Benton I)	1.9[D]	6/15/02-9/15/02	1.64	143	107.25
Rugby, ND			1.6	71	149
Elm Creek, MN			1.49	67	100
Wessington Springs, SD (2009)			1.48	34	51
PrairieWinds ND1 (Minot), ND 2011			1.39	80	115.5
PrairieWinds SD1 (Crow Lake), SD			1.23	108	162
NPPD Ainsworth, NE			1.16	36	20.5
Buffalo Ridge, MN (Phase I; 1999)			0.74	73	25
Wessington Springs, SD (2010)			0.41	34	51
Buffalo Ridge I, SD (2010)			0.16	24	50.4

Appendix A1. Wind energy facilities in North America with comparable activity and fatality data for bats, separated by geographic region.

Wind Energy Facility	Bat Activity Estimate[A]	Bat Activity Dates	Fatality Estimate[B]	No. of Turbines	Total MW
		Southern Plains			
Barton Chapel, TX			3.06	60	120
Big Smile, OK			2.90	66	132
Buffalo Gap II, TX			0.14	155	233
Red Hills, OK			0.11	82	123
Buffalo Gap I, TX			0.10	67	134
		Northeast			
Mountaineer, WV (2003)			31.69	44	66
Mount Storm, WV (2009)	30.09	7/15/09-10/7/09	17.53	132	264
Noble Wethersfield, NY			16.30	84	126
Criterion, MD (2011)			15.61	28	70
Mount Storm, WV (2010)	36.67[G]	4/18/10-10/15/10	15.18	132	264
Locust Ridge, PA (Phase II; 2010)			14.38	51	102
Locust Ridge, PA (Phase II; 2009)			14.11	51	102
Casselman, PA (2008)			12.61	23	34.5
Maple Ridge, NY (2006)			11.21	120	198
Cohocton/Dutch Hills, NY (2010)			10.32	50	125
Wolfe Island, Ont (July-December 2010)			9.50	86	197.8
Maple Ridge, NY (2007)			9.42	195	321.75
Cohocton/Dutch Hill, NY (2009)			8.62	50	125
Casselman, PA (2009)			8.60	23	34.5
Noble Bliss, NY (2008)			7.80	67	100
Criterion, MD (2012)			7.62	28	70
Mount Storm, WV (2011)			7.43	132	264
Mount Storm, WV (Fall 2008)	35.2	7/20/08-10/12/08	6.62	82	164
Wolfe Island, Ont (July-December 2009)			6.42	86	197.8
Maple Ridge, NY (2008)			4.96	195	321.75
Noble Clinton, NY (2009)	1.9[C]	8/1/09-09/31/09	4.50	67	100
Casselman Curtailment, PA (2008)			4.40	23	35.4
Noble Altona, NY			4.34	65	97.5
Noble Ellenburg, NY (2009)	16.1[C]	8/16/09-09/15/09	3.91	54	80
Noble Bliss, NY (2009)			3.85	67	100
Lempster, NH (2010)			3.57	12	24
Noble Ellenburg, NY (2008)			3.46	54	80
Noble Clinton, NY (2008)	2.1[C]	8/8/08-09/31/08	3.14	67	100
Lempster, NH (2009)			3.11	12	24
Mars Hill, ME (2007)			2.91	28	42
Wolfe Island, Ont (July-December 2011)			2.49	86	197.8
Noble Chateaugay, NY			2.44	71	106.5
High Sheldon, NY (2010)			2.33	75	112.5
Beech Ridge, WV			2.03	67	100.5
Munnsville, NY (2008)			1.93	23	34.5
High Sheldon, NY (2011)			1.78	75	112.5
Stetson Mountain II, ME (2010)			1.65	17	25.5
Stetson Mountain I, ME (2009)	28.5; 0.3[H]	7/10/09-10/15/09	1.40	38	57
Mars Hill, ME (2008)			0.45	28	42
Stetson Mountain I, ME (2011)			0.28	38	57
Kibby, ME (2011)			0.12	44	132
		Southeast			
Buffalo Mountain, TN (2005)			39.70	18	28.98
Buffalo Mountain, TN (2000-2003)	23.7[E]		31.54	3	1.98

Appendix A1. Wind energy facilities in North America with comparable activity and fatality data for bats, separated by geographic region.

Wind Energy Facility	Bat Activity Estimate[A]	Bat Activity Dates	Fatality Estimate[B]	No. of Turbines	Total MW
		Rocky Mountains			
Summerview, Alb (2008)	7.65[D]	07/15/06-07-09/30/06-07	11.42	39	70.2
Summerview, Alb (2006)			10.27	39	70.2
Judith Gap, MT (2006/2007)			8.93	90	135
Foote Creek Rim, WY (Phase I; 1999)			3.97	69	41.4
Judith Gap, MT (2009)			3.20	90	135
Foote Creek Rim, WY (Phase I; 2001-2002)	2.2[D,E]	6/15/01-9/1/01	1.57	69	41.4
Foote Creek Rim, WY (Phase I; 2000)	2.2[D,E]	6/15/00-9/1/00	1.05	69	41.4
		Southwest			
Dry Lake I, AZ	8.8	4/29/10-11/10/10	3.43	30	63
Dry Lake II, AZ	11.5	5/11/11-10/26/11	1.66	31	65
		Pacific Northwest			
Biglow Canyon, OR (Phase II; 2009/2010)			2.71	65	150
Nine Canyon, WA			2.47	37	48.1
Stateline, OR/WA (2003)			2.29	454	299
Elkhorn, OR (2010)			2.14	61	101
White Creek, WA (2007-2011)			2.04	89	204.7
Biglow Canyon, OR (Phase I; 2008)			1.99	76	125.4
Leaning Juniper, OR			1.98	67	100.5
Big Horn, WA			1.90	133	199.5
Combine Hills, OR (Phase I; 04/05)			1.88	41	41
Linden Ranch, WA			1.68	25	50
Pebble Springs, OR			1.55	47	98.7
Hopkins Ridge, WA (2008)			1.39	87	156.6
Harvest Wind, WA (2010-2012)			1.27	43	98.9
Elkhorn, OR (2008)			1.26	61	101
Vansycle, OR			1.12	38	24.9
Klondike III (Phase I), OR			1.11	125	223.6
Stateline, OR/WA (2002)			1.09	454	299
Stateline, OR/WA (2006)			0.95	454	299
Tuolumne (Windy Point I), WA			0.94	62	136.6
Klondike, OR			0.77	16	24
Combine Hills, OR (2011)			0.73	104	104
Hopkins Ridge, WA (2006)			0.63	83	150
Biglow Canyon, OR (Phase I; 2009)			0.58	76	125.4
Biglow Canyon, OR (Phase II; 2010/2011)			0.57	65	150
Hay Canyon, OR			0.53	48	100.8
Klondike II, OR			0.41	50	75
Windy Flats, WA			0.41	114	262.2
Vantage, WA			0.40	60	90
Wild Horse, WA			0.39	127	229
Goodnoe, WA			0.34	47	94
Marengo II, WA (2009/2010)			0.27	39	70.2
Biglow Canyon, OR (Phase III; 2010/2011)			0.22	76	174.8
Marengo I, WA (2009/2010)			0.17	78	140.4
Klondike IIIa (Phase II), OR			0.14	51	76.5
Kittitas Valley, WA (2011-2012)			0.12	48	100.8

Appendix A1. Wind energy facilities in North America with comparable activity and fatality data for bats, separated by geographic region.

Wind Energy Facility	Bat Activity Estimate[A]	Bat Activity Dates	Fatality Estimate[B]	No. of Turbines	Total MW
		California			
Shiloh I, CA			3.92	100	150
Shiloh II, CA			2.72	75	150
High Winds, CA (2004)			2.51	90	162
Dillon, CA			2.17	45	45
High Winds, CA (2005)			1.52	90	162
Alta Wind I, CA (2011)	4.42[I]	6/26/2009 - 10/31/2009	1.28	100	150
Diablo Winds, CA			0.82	31	20.46
Alite, CA			0.24	8	24
Alta Wind II-V, CA (2011)	0.78	6/26/2009 - 10/31/2009	0.08	190	570

A = Bat passes per detector-night
B = Number of fatalities per megawatt per year
C = Activity rate based on data collected at various heights all other activity rates are from ground-based units only
D = Activity rate was averaged across phases and/or years
E = Activity rate calculated by WEST from data presented in referenced report
F= Activity rate based on pre-construction monitoring; data for all other activity and fatality rates were collected concurrently
G = Activity rate based on data collected from ground-based units excluding reference stations during the spring, summer, and fall seasons
H = The overall activity rate of 28.5 is from reference stations located along forest edges which may be attractive to bats; the activity rate of 0.3 is from one unit placed on a nacelle
I = Average of ground-based detectors at CPC Proper (Phase I) for late summer/fall period only

Appendix A1 (*continued*). Wind energy facilities in North America with comparable fatality data for bats.

Project, Location	Activity Reference	Fatality Reference	Project, Location	Activity Reference	Fatality Reference
Alite, CA		Chatfield et al. 2010	Kewaunee County, WI		Howe et al. 2002
Alta Wind I, CA (11)	Solick et al. 2010	Chatfield et al. 2012	Kibby, ME (11)		Stantec 2012
Alta Wind II-V, CA (11)	Solick et al. 2010	Chatfield et al. 2012	Kittitas Valley, WA (11-12)		Stantec Consulting Services 2012
Barton I&II, IA		Derby et al. 2011a	Klondike, OR		Johnson et al. 2003
Barton Chapel, TX		WEST 2011	Klondike II, OR		NWC and WEST 2007
Beech Ridge, WV		Tidhar et al. 2013	Klondike III (Phase I), OR		Gritski et al. 2010
Big Horn, WA		Kronner et al. 2008	Klondike IIIa (Phase II), OR		Gritski et al. 2011
Big Smile, OK		Derby et al. 2013a	Leaning Juniper, OR		Gritski et al. 2008
Biglow Canyon, OR (Ph. I; 08)		Jeffrey et al. 2009a	Lempster, NH (09)		Tidhar et al. 2010
Biglow Canyon, OR (Ph. I; 09)		Enk et al. 2010	Lempster, NH (10)		Tidhar et al. 2011
Biglow Canyon, OR (Ph. II; 09/10)		Enk et al. 2011a	Linden Ranch, WA		Enz and Bay 2011
Biglow Canyon, OR (Ph. II; 10/ 11)		Enk et al. 2012b	Locust Ridge, PA (Ph. II; 09)		Arnett et al. 2011
Biglow Canyon, OR (Ph. III; 10/ 11)		Enk et al. 2012a	Locust Ridge, PA (Ph. II; 10)		Arnett et al. 2011
Blue Sky Green Field, WI	Gruver 2008	Gruver et al. 2009	Maple Ridge, NY (06)		Jain et al. 2007
Buffalo Gap I, TX		Tierney 2007	Maple Ridge, NY (07)		Jain et al. 2009a
Buffalo Gap II, TX		Tierney 2009	Maple Ridge, NY (08)		Jain et al. 2009d
Buffalo Mountain, TN (00-03)	Fiedler 2004	Nicholson et al. 2005	Marengo I, WA (09)		URS Corporation 2010b
Buffalo Mountain, TN (05)		Fiedler et al. 2007	Marengo II, WA (09)		URS Corporation 2010c
Buffalo Ridge, MN (Ph. I; 99)		Johnson et al. 2000	Mars Hill, ME (07)		Stantec 2008
Buffalo Ridge, MN (Ph. II; 98)		Johnson et al. 2000	Mars Hill, ME (08)		Stantec 2009a
Buffalo Ridge, MN (Ph. II; 99)		Johnson et al. 2000	Moraine II, MN		Derby et al. 2010d
Buffalo Ridge, MN (Ph. II; 01/Lake Benton I)	Johnson et al. 2004	Johnson et al. 2004	Mount Storm, WV (Fall 08)	Young et al. 2009b	Young et al. 2009b
Buffalo Ridge, MN (Ph. II; 02/Lake Benton I)	Johnson et al. 2004	Johnson et al. 2004	Mount Storm, WV (09)	Young et al. 2009a, 2010b	Young et al. 2009a, 2010b
Buffalo Ridge, MN (Ph. III; 99)		Johnson et al. 2000	Mount Storm, WV (10)	Young et al. 2010a, 2011b	Young et al. 2010a, 2011b
Buffalo Ridge, MN (Ph. III; 01/Lake Benton II)	Johnson et al. 2004	Johnson et al. 2004	Mount Storm, WV (11)		Young et al. 2011a, 2012b
Buffalo Ridge, MN (Ph. III; 02/Lake Benton II)	Johnson et al. 2004	Johnson et al. 2004	Mountaineer, WV (2003)		Kerns and Kerlinger 2004
Buffalo Ridge I, SD (10)		Derby et al. 2010b	Munnsville, NY (08)		Stantec 2009b
Buffalo Ridge II, SD (11)		Derby et al. 2012a	Nine Canyon, WA		Erickson et al. 2003
Casselman, PA (08)		Arnett et al. 2009a	Noble Altona, NY		Jain et al. 2011b
Casselman, PA (09)		Arnett et al. 2010	Noble Bliss, NY (08)		Jain et al.2009e
Casselman Curtailment, PA (08)		Arnett et al. 2009b	Noble Bliss, NY (09)		Jain et al. 2010a
Cedar Ridge, WI (09)	BHE Environmental 2008	BHE Environmental 2010	Noble Chateaugay, NY		Jain et al. 2011c
Cedar Ridge, WI (10)	BHE Environmental 2008	BHE Environmental 2011	Noble Clinton, NY (08)	Reynolds 2010a	Jain et al. 2009c
Cohocton/Dutch Hill, NY (09)		Stantec 2010	Noble Clinton, NY (09)	Reynolds 2010a	Jain et al. 2010b
Cohocton/Dutch Hill, NY (10)		Stantec 2011	Noble Ellenburg, NY (08)		Jain et al. 2009b
Combine Hills, OR		Young et al. 2006	Noble Ellenburg, NY (09)	Reynolds 2010b	Jain et al. 2010c
Combine Hills, OR (11)		Enz et al. 2012	Noble Wethersfield, NY		Jain et al. 2011a
Crescent Ridge, IL		Kerlinger et al. 2007	NPPD Ainsworth, NE		Derby et al. 2007
Criterion, MD (11)		Young et al. 2012a	Pebble Springs, OR		Gritski and Kronner 2010b
Criterion, MD (12)		Young et al. 2013	Pioneer Prairie, IA (Ph. II)		Chodachek et al. 2012
Crystal Lake II, IA		Derby et al. 2010a	PrairieWinds ND1 (Minot), ND		Derby et al. 2011c
Diablo Winds, CA		WEST 2006, 2008	PrairieWinds ND1 (Minot), ND (11)		Derby et al. 2012c
Dillon, CA		Chatfield et al. 2009	PrairieWinds SD1, SD		Derby et al. 2012d
Dry Lake I, AZ	Thompson et al. 2011	Thompson et al. 2011	Red Hills, OK		Derby et al. 2013b
Dry Lake II, AZ	Thompson and Bay 2012	Thompson and Bay 2012	Ripley, Ont (08)		Jacques Whitford 2009
Elkhorn, OR (08)		Jeffrey et a. 2009b	Rugby, ND		Derby et al. 2011b
Elkhorn, OR (10)		Enk et al. 2011b	Shiloh I, CA		Kerlinger et al. 2009
Elm Creek, MN		Derby et al. 2010c	Shiloh II, CA		Kerlinger et al. 2010b
Elm Creek II, MN		Derby et al. 2012b	Stateline, OR/WA (02)		Erickson et al. 2004
Foote Creek Rim, WY (Ph. I; 99)		Young et al. 2003a	Stateline, OR/WA (03)		Erickson et al. 2004
Foote Creek Rim, WY (Ph. I;	Gruver 2002	Young et al. 2003a,	Stateline, OR/WA (06)		Erickson et al. 2007

Appendix A1 (*continued*). Wind energy facilities in North America with comparable fatality data for bats.

Project, Location	Activity Reference	Fatality Reference	Project, Location	Activity Reference	Fatality Reference
00)		2003b			
Foote Creek Rim, WY (Ph. I; 01-02)	Gruver 2002	Young et al. 2003a, 2003b	Stetson Mountain, ME (09)	Stantec 2009c	Stantec 2009c
Forward Energy Center, WI	Watt and Drake 2011	Grodsky and Drake 2011	Stetson Mountain I, ME (11)		Normandeau Associates 2011
Fowler I, IN (09)		Good et al. 2011	Stetson Mountain II, ME (10)		Normandeau Associates 2010
Fowler III, IN (09)		Good et al. 2011	Summerview, Alb (06)		Brown and Hamilton 2006b
Fowler I, II, III, IN (10)		Good et al. 2011	Summerview, Alb (08)	Baerwald 2008	Baerwald 2008
Fowler I, II, III, IN (11)		Good et al. 2012	Top of Iowa, IA (03)		Jain 2005
Fowler I, II, III, IN (12)		Good et al. 2013	Top of Iowa, IA (04)	Jain 2005	Jain 2005
Goodnoe, WA		URS Corporation 2010a	Tuolumne (Windy Point I), WA		Enz and Bay 2010
Grand Ridge, IL		Derby et al. 2010g	Vansycle, OR		Erickson et al. 2000
Harrow, Ont. (10)		NRSI 2011	Vantage, WA		Ventus 2012
Harvest Wind, WA (10-12)		Downes and Gritski 2012a	Wessington Springs, SD (09)		Derby et al. 2010f
Hay Canyon, OR		Gritski and Kronner 2010a	Wessington Springs, SD (10)		Derby et al. 2011d
High Sheldon, NY (10)		Tidhar et al. 2012a	White Creek, WA (07-11)		Downes and Gritski 2012b
High Sheldon, NY (11)		Tidhar et al. 2012b	Wild Horse, WA		Erickson et al. 2008
High Winds, CA (04)		Kerlinger et al. 2006	Windy Flats, WA		Enz et al. 2011
High Winds, CA (05)		Kerlinger et al. 2006	Winnebago, IA		Derby et al. 2010e
Hopkins Ridge, WA (06)		Young et al. 2007	Wolfe Island, Ont (Jul-Dec 09)		Stantec Ltd. 2010b
Hopkins Ridge, WA (08)		Young et al. 2009c	Wolfe Island, Ont (Jul-Dec 10)		Stantec Ltd. 2011b
Judith Gap, MT (06-07)		TRC 2008	Wolfe Island, Ont (Jul-Dec 11)		Stantec Ltd. 2012
Judith Gap, MT (09)		Poulton and Erickson 2010			

Appendix A2. Fatality estimates for North American wind-energy facilities.

Project	Bat Fatalities (bats/MW/ year)	Predominant Habitat Type	Citation
Alite, CA	0.24	Shrub/scrub & grassland	Chatfield et al. 2010
Alta Wind I, CA (2011)	1.28	Woodland, grassland, shrubland	Chatfield et al. 2012
Alta Wind II-V, CA (2011)	0.08	Desert scrub	Chatfield et al. 2012
Barton I & II, IA	1.85	Agriculture	Derby et al. 2011a
Barton Chapel, TX	3.06	Agriculture/forest	WEST 2011
Beech Ridge, WV	2.03	Forest	Tidhar et al. 2013
Big Horn, WA	1.9	Agriculture/grassland	Kronner et al. 2008
Big Smile, OK	2.9	Grassland, agriculture	Derby et al. 2013a
Biglow Canyon, OR (Phase I; 2008)	1.99	Agriculture/grassland	Jeffrey et al. 2009a
Biglow Canyon, OR (Phase I; 2009)	0.58	Agriculture/grassland	Enk et al. 2010
Biglow Canyon, OR (Phase II; 2009/2010)	2.71	Agriculture	Enk et al. 2011a
Biglow Canyon, OR (Phase II; 2010/2011)	0.57	Grassland/shrub-steppe, agriculture	Enk et al. 2012b
Biglow Canyon, OR (Phase III; 2010/2011)	0.22	Grassland/shrub-steppe, agriculture	Enk et al. 2012a
Blue Sky Green Field, WI	24.57	Agriculture	Gruver et al. 2009
Buffalo Gap I, TX	0.1	Grassland	Tierney 2007
Buffalo Gap II, TX	0.14	Forest	Tierney 2009
Buffalo Mountain, TN (2000-2003)	31.54	Forest	Nicholson et al. 2005
Buffalo Mountain, TN (2005)	39.7	Forest	Fiedler et al. 2007
Buffalo Ridge, MN (Phase I; 1999)	0.74	Agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase II; 1998)	2.16	Agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase II; 1999)	2.59	Agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase II; 2001/Lake Benton I)	4.35	Agriculture	Johnson et al. 2004
Buffalo Ridge, MN (Phase II; 2002/Lake Benton I)	1.64	Agriculture	Johnson et al. 2004
Buffalo Ridge, MN (Phase III; 1999)	2.72	Agriculture	Johnson et al. 2000
Buffalo Ridge, MN (Phase III; 2001/Lake Benton II)	3.71	Agriculture	Johnson et al. 2004
Buffalo Ridge, MN (Phase III; 2002/Lake Benton II)	1.81	Agriculture	Johnson et al. 2004
Buffalo Ridge I, SD (2010)	0.16	Agriculture/grassland	Derby et al. 2010b
Buffalo Ridge II, SD (2011)	2.81	Agriculture, grassland	Derby et al. 2012a
Casselman Curtailment, PA (2008)	4.4	Forest	Arnett et al. 2009a
Casselman, PA (2008)	12.61	Forest	Arnett et al. 2010
Casselman, PA (2009)	8.6	Forest, pasture, grassland	Arnett et al. 2009b

Appendix A2. Fatality estimates for North American wind-energy facilities.

Project	Bat Fatalities (bats/MW/ year)	Predominant Habitat Type	Citation
Cedar Ridge, WI (2009)	30.61	Agriculture	BHE Environmental 2010
Cedar Ridge, WI (2010)	24.12	Agriculture	BHE Environmental 2011
Cohocton/Dutch Hill, NY (2009)	8.62	Agriculture/forest	Stantec 2010
Cohocton/Dutch Hills, NY (2010)	10.32	Agriculture, forest	Stantec 2011
Combine Hills, OR (Phase I; 04/05)	1.88	Agriculture/grassland	Young et al. 2006
Combine Hills, OR (2011)	0.73	Grassland/shrub-steppe, agriculture	Enz et al. 2012
Crescent Ridge, IL	3.27	Agriculture	Kerlinger et al. 2007
Criterion, MD (2011)	15.61	Forest, agriculture	Young et al. 2012a
Criterion, MD (2012)	7.62	Forest, agriculture	Young et al. 2013
Crystal Lake II, IA	7.42	Agriculture	Derby et al. 2010a
Diablo Winds, CA	0.82	NA	WEST 2006, 2008
Dillon, CA	2.17	Desert	Chatfield et al. 2009
Dry Lake I, AZ	3.43	Desert grassland/forested	Thompson et al. 2011
Dry Lake II, AZ	1.66	Desert grassland/forested	Thompson and Bay 2012
Elkhorn, OR (2008)	1.26	Shrub/scrub & agriculture	Jeffrey et al. 2009b
Elkhorn, OR (2010)	2.14	Shrub/scrub & agriculture	Enk et al. 2011b
Elm Creek, MN	1.49	Agriculture	Derby et al. 2010c
Elm Creek II, MN	2.81	Agriculture, grassland	Derby et al. 2012b
Foote Creek Rim, WY (Phase I; 1999)	3.97	Grassland	Young et al. 2003a
Foote Creek Rim, WY (Phase I; 2000)	1.05	Grassland	Young et al. 2003a
Foote Creek Rim, WY (Phase I; 2001-2002)	1.57	Grassland	Young et al. 2003a
Forward Energy Center, WI	18.17	Agriculture	Grodsky and Drake 2011
Fowler I, IN (2009)	8.09	Agriculture	Good et al. 2011
Fowler III, IN (2009)	1.84	Agriculture	Good et al. 2011
Fowler I, II, III, IN (2010)	18.96	Agriculture	Good et al. 2011
Fowler I, II, III, IN (2011)	20.19	Agriculture	Good et al. 2012
Fowler I, II, III, IN (2012)	2.96	Agriculture	Good et al. 2013
Goodnoe, WA	0.34	Grassland and shrub-steppe	URS Corporation 2010a
Grand Ridge I, IL	2.1	Agriculture	Derby et al. 2010g
Harrow, Ont (2010)	11.13	Agriculture	Natural Resource Solutions Inc. (NRSI) 2011
Harvest Wind, WA (2010-2012)	1.27	Grassland/shrub-steppe	Downes and Gritski 2012a
Hay Canyon, OR	0.53	Agriculture	Gritski and Kronner 2010a
High Sheldon, NY (2010)	2.33	Agriculture	Tidhar et al. 2012a
High Sheldon, NY (2011)	1.78	Agriculture	Tidhar et al. 2012b
High Winds, CA (2004)	2.51	Agriculture/grassland	Kerlinger et al. 2006
High Winds, CA (2005)	1.52	Agriculture/grassland	Kerlinger et al. 2006
Hopkins Ridge, WA (2006)	0.63	Agriculture/grassland	Young et al. 2007
Hopkins Ridge, WA (2008)	1.39	Agriculture/grassland	Young et al. 2009c
Judith Gap, MT (2006/2007)	8.93	Agriculture/grassland	TRC 2008

Appendix A2. Fatality estimates for North American wind-energy facilities.

Project	Bat Fatalities (bats/MW/ year)	Predominant Habitat Type	Citation
Judith Gap, MT (2009)	3.2	Agriculture/grassland	Poulton and Erickson 2010
Kewaunee County, WI	6.45	Agriculture	Howe et al. 2002
Kibby, ME (2011)	0.12	Forest; commercial forest	Stantec 2012
Kittitas Valley, WA (2011-2012)	0.12	Sagebrush-steppe, grassland	Stantec Consulting Services 2012
Klondike, OR	0.77	Agriculture/grassland	Johnson et al. 2003
Klondike II, OR	0.41	Agriculture/grassland	NWC and WEST 2007
Klondike III (Phase I), OR	1.11	Agriculture/grassland	Gritski et al. 2010
Klondike IIIa (Phase II), OR	0.14	Grassland/shrub-steppe and agriculture	Gritski et al. 2011
Leaning Juniper, OR	1.98	Agriculture	Gritski et al. 2008
Lempster, NH (2009)	3.11	Grasslands/forest/rocky embankments	Tidhar et al. 2010
Lempster, NH (2010)	3.57	Grasslands/forest/rocky embankments	Tidhar et al. 2011
Linden Ranch, WA	1.68	Grassland/shrub-steppe, agriculture	Enz and Bay 2011
Locust Ridge, PA (Phase II; 2009)	14.11	Grassland	Arnett et al. 2011
Locust Ridge, PA (Phase II; 2010)	14.38	Grassland	Arnett et al. 2011
Maple Ridge, NY (2006)	11.21	Agriculture/forested	Jain et al. 2007
Maple Ridge, NY (2007)	9.42	Agriculture/forested	Jain et al. 2009a
Maple Ridge, NY (2008)	4.96	Agriculture/forested	Jain et al. 2009d
Marengo I, WA (2009/2010)	0.17	Agriculture	URS Corporation 2010b
Marengo II, WA (2009/2010)	0.27	Agriculture	URS Corporation 2010c
Mars Hill, ME (2007)	2.91	Forest	Stantec 2008
Mars Hill, ME (2008)	0.45	Forest	Stantec 2009a
Moraine II, MN	2.42	Agriculture/grassland	Derby et al. 2010d
Mount Storm, WV (Fall 2008)	6.62	Forest	Young et al. 2009b
Mount Storm, WV (2009)	17.53	Forest	Young et al. 2009a, 2010b
Mount Storm, WV (2010)	15.18	Forest	Young et al. 2010a, 2011b
Mount Storm, WV (2011)	7.43	Forest	Young et al. 2011a, 2012b
Mountaineer, WV (2003)	31.69	Forest	Kerns and Kerlinger 2004
Munnsville, NY (2008)	1.93	Agriculture/forest	Stantec 2009b
Nine Canyon, WA	2.47	Agriculture/grassland	Erickson et al. 2003
Noble Altona, NY	4.34	Forest	Jain et al. 2011b
Noble Bliss, NY (2008)	7.8	Agriculture/forest	Jain et al.2009e
Noble Bliss, NY (2009)	3.85	Agriculture/forest	Jain et al. 2010a
Noble Chateaugay, NY	2.44	Agriculture	Jain et al. 2011c
Noble Clinton, NY (2008)	3.14	Agriculture/forest	Jain et al. 2009c
Noble Clinton, NY (2009)	4.5	Agriculture/forest	Jain et al. 2010b
Noble Ellenburg, NY (2008)	3.46	Agriculture/forest	Jain et al. 2009b
Noble Ellenburg, NY (2009)	3.91	Agriculture/forest	Jain et al. 2010c
Noble Wethersfield, NY	16.3	Agriculture	Jain et al. 2011a
NPPD Ainsworth, NE	1.16	Agriculture/grassland	Derby et al. 2007
Pebble Springs, OR	1.55	Grassland	Gritski and Kronner 2010b
Pioneer Prairie I, IA (Phase II)	10.06	Agriculture, grassland	Chodachek et al. 2012

Appendix A2. Fatality estimates for North American wind-energy facilities.

Project	Bat Fatalities (bats/MW/ year)	Predominant Habitat Type	Citation
PrairieWinds ND1 (Minot), ND 2010	2.13	Agriculture	Derby et al. 2011c
PrairieWinds ND1 (Minot), ND 2011	1.39	Agriculture, grassland	Derby et al. 2012c
PrairieWinds SD1 (Crow Lake), SD	1.23	Grassland	Derby et al. 2012d
Red Hills, OK	0.11	Grassland	Derby et al. 2013b
Ripley, Ont (2008)	4.67	Agriculture	Jacques Whitford 2009
Rugby, ND	1.6	Agriculture	Derby et al. 2011b
Shiloh I, CA	3.92	Agriculture/grassland	Kerlinger et al. 2010a
Shiloh II, CA	2.72	Agriculture	Kerlinger et al. 2010b
Stateline, OR/WA (2002)	1.09	Agriculture/grassland	Erickson et al. 2004
Stateline, OR/WA (2003)	2.29	Agriculture/grassland	Erickson et al. 2004
Stateline, OR/WA (2006)	0.95	Agriculture/grassland	Erickson et al. 2007
Stetson Mountain I, ME (2009)	1.4	Forest	Stantec 2009c
Stetson Mountain I, ME (2011)	0.28	Forested	Normandeau Associates 2011
Stetson Mountain II, ME (2010)	1.65	Forested	Normandeau Associates 2010
Summerview, Alb (2006)	10.27	Agriculture	Brown and Hamilton 2006b
Summerview, Alb (2008)	11.42	Agriculture/grassland	Baerwald 2008
Top of Iowa, IA (2003)	7.16	Agriculture	Jain 2005
Top of Iowa, IA (2004)	10.27	Agriculture	Jain 2005
Tuolumne (Windy Point I), WA	0.94	Grassland/shrub-steppe, agriculture and forest	Enz and Bay 2010
Vansycle, OR	1.12	Agriculture/grassland	Erickson et al. 2000
Vantage, WA	0.4	Shrub-steppe, grassland	Ventus Environmental Solutions 2012
Wessington Springs, SD (2009)	1.48	Grassland	Derby et al. 2010f
Wessington Springs, SD (2010)	0.41	Grassland	Derby et al. 2011d
White Creek, WA (2007-2011)	2.04	Grassland/shrub-steppe, agriculture	Downes and Gritski 2012b
Wild Horse, WA	0.39	Grassland	Erickson et al. 2008
Windy Flats, WA	0.41	Grassland/shrub-steppe, agriculture	Enz et al. 2011
Winnebago, IA	4.54	Agriculture/grassland	Derby et al. 2010e
Wolfe Island, Ont (July-December 2009)	6.42	Grassland	Stantec Ltd. 2010b
Wolfe Island, Ont (July-December 2010)	9.5	Grassland	Stantec Ltd. 2011b
Wolfe Island, Ont (July-December 2011)	2.49	Grassland	Stantec Ltd. 2012

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Alite, CA	8	24	80	8	200 m x 200 m	1 year	Weekly (spring, fall), bi-monthly (summer, winter)
Alta Wind I, CA (2011)	100	150	80	25	120-m radius circle	12.5 months	Every two weeks
Alta Wind II-V, CA (2011)	190	570	NA	41	120-m radius circle	14.5 months	Every two weeks
Barton Chapel, TX	60	120	78	30	200 m x 200 m	1 year	10 turbines weekly, 20 monthly
Barton I & II, IA	80	160	100	35 (9 turbines were dropped in June 2010 due to landowner issues) 26 turbines were searched for the remainder of the study	200 m x 200 m	1 year	Weekly (spring, fall; migratory turbines), monthly (summer, winter; non-migratory turbines)
Beech Ridge, WV	67	100.5	80	67	40 m radius	7 months	Every two days
Big Horn, WA	133	199.5	80	133	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Big Smile, OK	66	132	NA	17 (plus one met tower)	100 x 100	1 year	Weekly (spring, summer, fall), monthly (winter)
Biglow Canyon, OR (Phase I; 2008)	76	125.4	80	50	110 m x 110 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Biglow Canyon, OR (Phase I; 2009)	76	125.4	80	50	110 m x 110 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Biglow Canyon, OR (Phase II; 2009/2010)	65	150	80	50	250 m x 250 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Biglow Canyon, OR (Phase II; 2010/2011)	65	150	NA	50	252 m x 252 m	1 year	Bi-weekly(spring, fall), monthly (summer, winter)
Biglow Canyon, OR (Phase III; 2010/2011)	76	174.8	NA	50	252 m x 252 m	1 year	Bi-weekly(spring, fall), monthly (summer, winter)

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Blue Sky Green Field, WI	88	145	80	30	160 m x 160 m	Fall, spring	Daily(10 turbines), weekly (20 turbines)
Buena Vista, CA	38	38	45-55	38	75-m radius	1 year	Monthly to bi-monthly starting in September 2008
Buffalo Gap I, TX	67	134	NA	21	215 m x 215 m	10 months	Every 3 weeks
Buffalo Gap II, TX	155	233	80	36	215 m x 215 m	14 months	Every 21 days
Buffalo Mountain, TN (2000-2003)	3	1.98	65	3	50-m radius	3 years	Bi-weekly, weekly, bi-monthly
Buffalo Mountain, TN (2005)	18	28.98	V47 = 65; V80 = 78	18	50-m radius	1 year	Bi-weekly, weekly, bi-monthly, and 2 to 5 day intervals
Buffalo Ridge, MN (1994/1995)	73	25	37	1994:10 plots (3 turbines/plot), 20 addition plots in Sept & Oct 1994, 1995: 30 turbines search every other week (Jan-Mar), 60 searched weekly (Apr, July, Aug) 73 searched weekly (May-June and Sept-Oct), 30 searched weekly (Nov-Dec)	100 x 100m	20 months	Varies. See number turbines searched or page 44 of report
Buffalo Ridge, MN (Phase I; 1996)	73	25	36	21	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)
Buffalo Ridge, MN (Phase I; 1997)	73	25	36	21	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)
Buffalo Ridge, MN (Phase I; 1998)	73	25	36	21	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)
Buffalo Ridge, MN (Phase I; 1999)	73	25	36	21	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)
Buffalo Ridge, MN (Phase II; 1998)	143	107.25	50	40	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Buffalo Ridge, MN (Phase II; 1999)	143	107.25	50	40	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)
Buffalo Ridge, MN (Phase II; 2001/Lake Benton I)	143	107.25	50	83	60 m x 60 m	Summer, fall	Bi-monthly
Buffalo Ridge, MN (Phase II; 2002/Lake Benton I)	143	107.25	50	103	60 m x 60 m	Summer, fall	Bi-monthly
Buffalo Ridge, MN (Phase III; 1999)	138	103.5	50	30	126 m x 126 m	1 year	Bi-monthly (spring, summer, and fall)
Buffalo Ridge, MN (Phase III; 2001/Lake Benton II)	138	103.5	50	83	60 m x 60 m	Summer, fall	Bi-monthly
Buffalo Ridge, MN (Phase III; 2002/Lake Benton II)	138	103.5	50	103	60 m x 60 m	Summer, fall	Bi-monthly
Buffalo Ridge I, SD (2010)	24	50.4	79	24	200 m x 200 m	1 year	Weekly (migratory), monthly (non-migratory)
Buffalo Ridge II, SD (2011)	105	210	78	65 (60 road and pad, 5 turbine plots)	100 x 100m	1 year	Weekly (spring, summer, fall), monthly (winter)
Casselman, PA (2008)	23	34.5	80	10	126 m x 120 m	7 months	Daily
Casselman, PA (2009)	23	34.5	80	10	126 m x 120 m	7.5 months	Daily searches
Casselman Curtailment, PA (2008)	23	35.4	80	12 experimental; 10 control	126 m x 120 m	2.5 months	Daily
Castle River, Alb (2001)	60	39.6	50	60	50-m radius	2 years	Weekly, bi-weekly
Castle River, Alb (2002)	60	39.6	50	60	50-m radius	2 years	Weekly, bi-weekly
Cedar Ridge, WI (2009)	41	67.6	80	20	160 m x 160 m	Spring, summer, fall	Daily, every 4 days; late fall searched every 3 days

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Cedar Ridge, WI (2010)	41	68	80	20	160 m x 160 m	1 year	Five turbines were surveyed daily, 15 turbines surveyed every 4 days in rotating groups each day. All 20 surveyed every three days during late fall
Cohocton/Dutch Hill, NY (2009)	50	125	80	17	130 m x 130 m	Spring, summer, fall	Daily (5 turbines), weekly (12 turbines)
Cohocton/Dutch Hills, NY (2010)	50	125	80	17	120 m x 120 m	Spring, summer, fall	Daily, weekly
Combine Hills, OR (Phase I; 04/05)	41	41	53	41	90-m radius	1 year	Monthly
Combine Hills, OR (2011)	104	104	53	52 (plus 1 MET tower)	180 m x 180 m	1 year	Bi-weekly(spring, fall), monthly (summer, winter)
Condon, OR	84	NA	NA	NA	NA	NA	NA
Crescent Ridge, IL	33	49.5	80	33	70-m radius	1 year	Weekly (fall, spring)
Criterion, MD (2011)	28	70	80	28	40-50m radius	7.3 months	Daily
Criterion, MD (2012)	28	70	80	14	40-50m radius	7.5 months	Weekly
Crystal Lake II, IA	80	200	80	16 turbines through week 6, and then 15 for duration of study	100 m x 100 m	Spring, summer, fall	3 times per week for 26 weeks
Diablo Winds, CA	31	20.46	50 and 55	31	75 m x 75 m	2 years	Monthly
Dillon, CA	45	45	69	15	200 m x 200 m	1 year	Weekly, bi-monthly in winter
Dry Lake I, AZ	30	63	78	15	160 m x 160 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Dry Lake II, AZ	31	65	78	31: 5 (full plot), 26 (road & pad)	160 m x 160 m	1 year	Twice weekly (spring, summer, fall), weekly (winter)
Elkhorn, OR (2008)	61	101	80	61	220 m x 220 m	1 year	Monthly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Elkhorn, OR (2010)	61	101	80	31	220 m x 220 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Elm Creek, MN	67	100	80	29	200 m x 200 m	1 year	Weekly, monthly
Elm Creek II, MN	62	148.8	80	30	200 x 200m (2 random migration search areas 100 x 100m)	1 year	20 searched every 28 days, 10 turbines every 7 days during migration)
Erie Shores, Ont	66	99	80	66	40-m radius	2 years	Weekly, bi-monthly, 2-3 times weekly (migration)
Foote Creek Rim, WY (Phase I; 1999)	69	41.4	40	69	126 m x 126 m	1 year	Monthly
Foote Creek Rim, WY (Phase I; 2000)	69	41.4	40	69	126 m x 126 m	1 year	Monthly
Foote Creek Rim, WY (Phase I; 2001-2002)	69	41.4	40	69	126 m x 126 m	1 year	Monthly
Forward Energy Center, WI	86	129	80	29	160 m x 160 m	2 years	11 turbines daily, 9 every 3 days, 9 every 5 days
Fowler I, IN (2009)	162	301	78 (Vestas), 80 (Clipper)	25	160 m x 160 m	Spring, summer, fall	Weekly, bi-weekly
Fowler I, II, III, IN (2010)	355	600	Vestas = 80, Clipper = 80, GE = 80	36 turbines, 100 road and pads	80 m x 80 m for turbines ; 40-m radius for roads and pads	Spring, fall	Daily, weekly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Fowler I, II, III, IN (2011)	355	600	Vestas = 80, Clipper = 80, GE = 80	177 road and pads (spring), 9 turbines & 168 roads and pads (fall)	Turbines (80 m circular plot), roads and pads (out to 80 m)	Spring, fall	Daily, weekly
Fowler I, II, III, IN (2012)	355	600	Vestas = 80, Clipper = 80, GE = 80	118 roads and pads	Roads and pads (out to 80 m)	2.5 months	Weekly
Fowler III, IN (2009)	60	99	78	12	160 m x 160 m	10 weeks	Weekly, bi-weekly
Goodnoe, WA	47	94	80	24	180 m x 180 m	1 year	14 days during migration periods, 28 days during non-migration periods
Grand Ridge I, IL	66	99	80	30	160 m x 160 m	1 year	Weekly, monthly
Harrow, Ont (2010)	24 (four 6-turb facilities)	39.6	NA	12 in July, 24 Aug-Oct	50-m radius from turbine base	4 months	Twice-weekly
Harvest Wind, WA (2010-2012)	43	98.9	80	32	180 m x 180 m & 240 m x 240 m	2 years	Twice a week, weekly and monthly
Hay Canyon, OR	48	100.8	79	20	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
High Sheldon, NY (2010)	75	112.5	80	25	115 m x 115 m	7 months	Daily (8 turbines), weekly (17 turbines)
High Sheldon, NY (2011)	75	112.5	80	25	115 m x 115 m	7 months	Daily (8 turbines), weekly (17 turbines)
High Winds, CA (2004)	90	162	60	90	75-m radius	1 year	Bi-monthly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
High Winds, CA (2005)	90	162	60	90	75-m radius	1 year	Bi-monthly
Hopkins Ridge, WA (2006)	83	150	67	41	180 m x 180 m	1 year	Monthly, weekly (subset of 22 turbines spring and fall migration)
Hopkins Ridge, WA (2008)	87	156.6	67	41-43	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Jersey Atlantic, NJ	5	7.5	80	5	130 m x 120 m	9 months	Weekly
Judith Gap, MT (2006/2007)	90	135	80	20	190 m x 190 m	7 months	Monthly
Judith Gap, MT (2009)	90	135	80	30	100 m x 100 m	5 months	Bi-monthly
Kewaunee County, WI	31	20.46	65	31	60 m x 60 m	2 years	Bi-weekly (spring, summer), daily (spring, fall migration), weekly (fall, winter)
Kibby, ME (2011)	44	132	124	22 turbines	75-m diameter circular plots	22 weeks	Avg 5-day
Kittitas Valley, WA (2011-2012)	48	100.8	80	48	100 m x 102 m	1 year	Bi weekly from Aug 15 - Oct 31 and March 16 - May 15; every 4 weeks from Nov 1 - March 15 and May 16 - Aug 14
Klondike, OR	16	24	80	16	140 m x 140 m	1 year	Monthly
Klondike II, OR	50	75	80	25	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (summer, winter)
Klondike III (Phase I), OR	125	223.6	GE = 80; Siemens= 80, Mitsubishi = 80	46	240 m x 240 m (1.5MW) 252 m x 252 m (2.3MW)	2 year	Bi-monthly (spring, fall migration), monthly (summer, winter)

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Klondike IIIa (Phase II), OR	51	76.5	GE = 80	34	240 m x 240 m	2 years	Bi-monthly (spring, fall), monthly (summer, winter)
Leaning Juniper, OR	67	100.5	80	17	240 m x 240 m	2 years	Bi-monthly (spring, fall), monthly (winter, summer)
Lempster, NH (2009)	12	24	78	4	120 m x 130 m	6 months	Daily
Lempster, NH (2010)	12	24	78	12	120 m x 130 m	6 months	Weekly
Linden Ranch, WA	25	50	80	25	110 m x 110 m	1 year	Bi-weekly(spring, fall), monthly (summer, winter)
Locust Ridge, PA (Phase II; 2009)	51	102	80	15	120m x 126m	6.5 months	Daily
Locust Ridge, PA (Phase II; 2010)	51	102	80	15	120m x 126m	6.5 months	Daily
Madison, NY	7	11.55	67	7	60-m radius	1 year	Weekly (spring, fall), monthly (summer)
Maple Ridge, NY (2006)	120	198	80	50	130 m x 120 m	5 months	Daily (10 turbines), every 3 days (10 turbines), weekly (30 turbines)
Maple Ridge, NY (2007)	195	321.75	80	64	130 m x 120 m	7 months	Weekly
Maple Ridge, NY (2008)	195	321.75	80	64	130 m x 120 m	7 months	Weekly
Marengo I, WA (2009/2010)	78	140.4	67	39	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Marengo II, WA (2009/2010)	39	70.2	67	20	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Mars Hill, ME (2007)	28	42	80.5	28	76-m diameter, extended plot 238-m diameter	Spring, summer, fall	Daily (2 random turbines), weekly (all turbines): extended plot searched once per season

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Mars Hill, ME (2008)	28	42	80.5	28	76-m diameter, extended plot 238-m diameter	Spring, summer, fall	Weekly: extended plot searched once per season
McBride, Alb (2004)	114	75	50	114	4 parallel transects 120-m wide	1 year	Weekly, bi-weekly
Melancthon, Ont (Phase I)	45	NA	NA	45	35m radius	5 months	Weekly, twice weekly
Meyersdale, PA (2004)	20	30	80	20	130 m x 120 m	6 weeks	Daily (half turbines), weekly (half turbines)
Moraine II, MN	33	49.5	82.5	30	200 m x 200 m	1 year	Weekly (migratory), monthly (non-migratory)
Mount Storm, WV (2009)	132	264	78	44	Varied	4.5 months	Weekly (28 turbines), daily (16 turbines)
Mount Storm, WV (2010)	132	264	78	24	20 to 60 m from turbine	6 months	Daily
Mount Storm, WV (2011)	132	264	78	24	Varied	6 months	Daily
Mount Storm, WV (Fall 2008)	82	164	78	27	Varied	3 months	Weekly (18 turbines), daily (9 turbines)
Mountaineer, WV (2003)	44	66	80	44	60-m radius	7 months	Weekly, monthly
Mountaineer, WV (2004)	44	66	80	44	130 m x 120 m	6 weeks	Daily, weekly
Munnsville, NY (2008)	23	34.5	69.5	12	120 m x 120 m	Spring, summer, fall	Weekly
Nine Canyon, WA	37	48.1	60	37	90-m radius	1 year	Bi-monthly (spring, summer, fall), monthly (winter)
Noble Altona, NY	65	97.5	80	22	120 m x 120 m	Spring, summer, fall	Daily, weekly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Noble Bliss, NY (2008)	67	100	80	23	120 m x 120 m	Spring, summer, fall	Daily (8 turbines), 3-day (8 turbines), weekly (7 turbines)
Noble Bliss, NY (2009)	67	100	80	23	120 m x 120 m	Spring, summer, fall	Weekly, 8 turbines searched daily from July 1 to August 15
Noble Chateaugay, NY	71	106.5	80	24	120 m x 120 m	Spring, summer, fall	Weekly
Noble Clinton, NY (2008)	67	100	80	23	120 m x 120 m	Spring, summer, fall	Daily (8 turbines), 3-day (8 turbines), weekly (7 turbines)
Noble Clinton, NY (2009)	67	100	80	23	120 m x 120 m	Spring, summer, fall	Daily (8 turbines), weekly (15 turbines), all turbines weekly from July 1 to August 15
Noble Ellenburg, NY (2008)	54	80	80	18	120 m x 120 m	Spring, summer, fall	Daily (6 turbines), 3-day (6 turbines), weekly (6 turbines)
Noble Ellenburg, NY (2009)	54	80	80	18	120 m x 120 m	Spring, summer, fall	Daily (6 turbines), weekly (12 turbines), all turbines weekly from July 1 to August 15
Noble Wethersfield, NY	84	126	80	28	120 m x 120 m	Spring, summer, fall	Weekly
NPPD Ainsworth, NE	36	20.5	70	36	220 m x 220 m	Spring, summer, fall	Bi-monthly
Oklahoma Wind Energy Center, OK	68	102	70	68	20m radius	3 months (2 years)	Bi-monthly
Pebble Springs, OR	47	98.7	79	20	180 m x 180 m	1 year	Bi-monthly (spring, fall), monthly (winter, summer)
Pine Tree, CA	90	135	65	40	NA	1 year	Bi-weekly
Pioneer Prairie I, IA (Phase II)	62	102.3	80	62 (57 road/pad) 5 full search plots	80 x 80m	1 year	Weekly (spring and fall), every two weeks (summer), monthly (winter)
PrairieWinds ND1 (Minot), ND 2010	80	115.5	89	35	Minimum of 100 m x 100 m	3 seasons	Bi-monthly
PrairieWinds ND1 (Minot), ND 2011	80	115.5	80	35	Minimum 100 x 100m	3 season	Twice monthly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
PrairieWinds SD1 (Crow Lake), SD	108	162	80	50	200 x 200m	1 year	Twice monthly (spring, summer, fall), monthly (winter)
Prince Wind Farm, Ont (2006)	126	189	80	38	63-m radius	4 months	Daily, weekly
Prince Wind Farm, Ont (2007)	126	189	80	38 turbines from January 1st - July 8th, 126 turbines from July 9th-October 31st	63- to 45-m radius	10 months	Daily, weekly
Prince Wind Farm, Ont (2008)	126	189	80	126	45m radius	6.5 months	Daily, 3x/week, 2x/week
Red Canyon, TX	56	84	70	28	200 m x 200 m in fall and winter; 160 m x 160 m in spring and summer	1 year	Every 14 days in fall and winter; 7 days in spring, 3 days in summer
Red Hills, OK	82	123	NA	20 (plus one met tower)	100 x 100	1 year	Weekly (spring, summer, fall), monthly (winter)
Ripley, Ont (2008)	38	76	64	38	80 m x 80 m	Spring, fall	Twice weekly for odd turbines; weekly for even turbines.
Ripley, Ont (Fall 2009)	38	76	64	38	80 m x 80 m	6 weeks	Twice weekly for odd turbines; weekly for even turbines.
Rugby, ND	71	149	78	32	200 m x 200 m	1 year	Weekly (spring, fall; migratory turbines), monthly (non-migratory turbines)
San Gorgonio, CA	3000	NA	24.4-42.7	NA	50-m radius	2 years	Quarterly
Searsburg, VT (2007)	11	7	65	11	20- to 55-m radius	Spring, fall	Weekly (fall migration)
Shiloh I, CA	100	150	65	100	105-m radius	3 years	Weekly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Shiloh II, CA	75	150	33 turbs = 115; 42 turbs = 125	25	100m radius	1 yr	Once/week
SMUD Solano, CA	22	15	65	22	60-m radius	1 year	Bi-monthly
Stateline, OR/WA (2002)	454	299	50	124	Minimum 126 m x 126 m	17 months	Bi-weekly, monthly
Stateline, OR/WA (2003)	454	299	50	153	Minimum 126 m x 126 m	1 year	Bi-weekly, monthly
Stateline, OR/WA (2006)	454	299	50	39	Variable turbine strings	1 year	Bi-weekly
Stetson Mountain I, ME (2009)	38	57	80	19	76-m diameter	27 weeks (spring, summer, fall)	Weekly
Stetson Mountain I, ME (2011)	38	57	80	19	Varied	6 months	Weekly
Stetson Mountain II, ME (2010)	17	25.5	80	17	Varied	6 months	Weekly (3 turbines twice a week)
Summerview, Alb (2006)	39	70.2	67	39	140 m x 140 m	1 year	Weekly, bi-weekly (May to July, September)
Summerview, Alb (2008)	39	70.2	65	39	52-m radius; 2 spiral transects 7 m apart	Summer, fall (2 years)	Daily (10 turbines), weekly (29 turbines)
Tehachapi, CA	3300	NA	14.7 to 57.6	201	50-m radius	20 months	Quarterly
Top of Iowa, IA (2003)	89	80	71.6	26	76 m x 76 m	Spring, summer, fall	Once every 2 to 3 days
Top of Iowa, IA (2004)	89	80	71.6	26	76 m x 76 m	Spring, summer, fall	Once every 2 to 3 days

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Tuolumne (Windy Point I), WA	62	136.6	80	21	180 m x 180 m	1 year	Monthly throughout the year, a sub-set of 10 turbines were also searched weekly during the spring, summer, and fall
Vansycle, OR	38	24.9	50	38	126 m x 126 m	1 year	Monthly
Vantage, WA	60	90	80	30	240 m x 240 m	1 year	Monthly, a subset of 10 searched weekly during migration
Wessington Springs, SD (2009)	34	51	80	20	200 m x 200 m	Spring, summer, fall	Bi-monthly
Wessington Springs, SD (2010)	34	51	80	20	200 m x 200 m	8 months	Bi-weekly (spring, summer, fall)
White Creek, WA (2007-2011)	89	204.7	80	89	180 m x 180 m & 240 m x 240 m	4 years	Twice a week, weekly and monthly
Wild Horse, WA	127	229	67	64	110 m from two turbines in plot	1 year	Monthly, weekly (fall, spring migration at 16 turbines)
Windy Flats, WA	114	262.2	NA	36 (plus 1 MET tower)	180 m x 180 m (120m at MET tower)	1 year	Monthly (spring, summer, fall, and winter), weekly (spring and fall migration)
Winnebago, IA	10	20	78	10	200 m x 200 m	1 year	Weekly (migratory), monthly (non-migratory)
Wolfe Island, Ont (May-June 2009)	86	197.8	80	86	60-m radius	Spring	43 twice weekly, 43 weekly
Wolfe Island, Ont (July-December 2009)	86	197.8	80	86	60-m radius	Summer, fall	43 twice weekly, 43 weekly
Wolfe Island, Ont (January-June 2010)	86	197.8	80	86	60-m radius	6 months	43 twice weekly, 43 weekly
Wolfe Island, Ont (July-December 2010)	86	197.8	80	86	50-m radius	6 months	43 twice weekly, 43 weekly

Appendix A3. All post-construction monitoring studies, project characteristics, and select study methodology.

Project Name	Total # of turbines	Total MW	Tower size (m)	Number turbines searched	Plot Size	Length of Study	Survey Frequency
Wolfe Island, Ont (January-June 2011)	86	197.8	80	86	50-m radius	6 months	43 twice weekly, 43 weekly
Wolfe Island, Ont (July-December 2011)	86	197.8	80	86	50-m radius	6 months	43 twice weekly, 43 weekly

Appendix A3 (*continued*). All post-construction monitoring studies, project characteristics, and select study methodology.

Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Alite, CA	Chatfield et al. 2010	Klondike II, OR	NWC and WEST 2007
Alta Wind I, CA (11)	Chatfield et al. 2012	Klondike III (Phase I), OR	Gritski et al. 2010
Alta Wind II-V, CA (11)	Chatfield et al. 2012	Klondike IIIa (Phase II), OR	Gritski et al. 2011
Barton I & II, IA	Derby et al. 2011a	Leaning Juniper, OR	Gritski et al. 2008
Barton Chapel, TX	WEST 2011	Lempster, NH (09)	Tidhar et al. 2010
Beech Ridge, WV	Tidhar et al. 2013	Lempster, NH (10)	Tidhar et al. 2011
Big Horn, WA	Kronner et al. 2008	Linden Ranch, WA	Enz and Bay 2011
Big Smile, OK	Derby et al. 2013a	Locust Ridge, PA (Phase II; 09)	Arnett et al. 2011
Biglow Canyon, OR (Phase I; 08)	Jeffrey et al. 2009a	Locust Ridge, PA (Phase II; 10)	Arnett et al. 2011
Biglow Canyon, OR (Phase I; 09)	Enk et al. 2010	Madison, NY	Kerlinger 2002b
Biglow Canyon, OR (Phase II; 09/10)	Enk et al. 2011a	Maple Ridge, NY (06)	Jain et al. 2007
Biglow Canyon, OR (Phase II; 10/11)	Enk et al. 2012b	Maple Ridge, NY (07)	Jain et al. 2009a
Biglow Canyon, OR (Phase III; 10/11)	Enk et al. 2012a	Maple Ridge, NY (08)	Jain et al. 2009d
Blue Sky Green Field, WI	Gruver et al. 2009	Marengo I, WA (09)	URS Corporation 2010b
Buena Vista, CA	Insignia Environmental 2009	Marengo II, WA (09)	URS Corporation 2010c
Buffalo Gap I, TX	Tierney 2007	Mars Hill, ME (07)	Stantec 2008
Buffalo Gap II, TX	Tierney 2009	Mars Hill, ME (08)	Stantec 2009a
Buffalo Mountain, TN (00-03)	Nicholson et al. 2005	McBride, Alb (04)	Brown and Hamilton 2004
Buffalo Mountain, TN (05)	Fiedler et al. 2007	Melancthon, Ont (Phase I)	Stantec Ltd. 2008
Buffalo Ridge, MN (94/95)	Osborn et al. 1996, 2000	Meyersdale, PA (04)	Arnett et al. 2005
Buffalo Ridge, MN (Phase I; 96)	Johnson et al. 2000	Moraine II, MN	Derby et al. 2010d
Buffalo Ridge, MN (Phase I; 97)	Johnson et al. 2000	Mount Storm, WV (Fall 08)	Young et al. 2009b
Buffalo Ridge, MN (Phase I; 98)	Johnson et al. 2000	Mount Storm, WV (09)	Young et al. 2009a, 2010b
Buffalo Ridge, MN (Phase I; 99)	Johnson et al. 2000	Mount Storm, WV (10)	Young et al. 2010a, 2011b
Buffalo Ridge, MN (Phase II;98)	Johnson et al. 2000	Mount Storm, WV (11)	Young et al. 2011a, 2012b
Buffalo Ridge, MN (Phase II; 99)	Johnson et al. 2000	Mountaineer, WV (03)	Kerns and Kerlinger 2004
Buffalo Ridge, MN (Phase II; 01/Lake Benton I)	Johnson et al. 2004	Mountaineer, WV (04)	Arnett et al. 2005
Buffalo Ridge, MN (Phase II; 02/Lake Benton I)	Johnson et al. 2004	Munnsville, NY (08)	Stantec 2009b
Buffalo Ridge, MN (Phase III; 99)	Johnson et al. 2000	Nine Canyon, WA	Erickson et al. 2003
Buffalo Ridge, MN (Phase III; 01/Lake Benton II)	Johnson et al. 2004	Noble Altona, NY	Jain et al. 2011b
Buffalo Ridge, MN (Phase III; 02/Lake Benton II)	Johnson et al. 2004	Noble Bliss, NY (08)	Jain et al.2009e
Buffalo Ridge I, SD (10)	Derby et al. 2010b	Noble Bliss, NY (09)	Jain et al. 2010a
Buffalo Ridge II, SD (11)	Derby et al. 2012a	Noble Chateaugay, NY	Jain et al. 2011c
Casselman, PA (08)	Arnett et al. 2009a	Noble Clinton, NY (08)	Jain et al. 2009c
Casselman, PA (09)	Arnett et al. 2010	Noble Clinton, NY (09)	Jain et al. 2010b
Casselman Curtailment, PA (08)	Arnett et al. 2009b	Noble Ellenburg, NY (08)	Jain et al. 2009b
Castle River, Alb (01)	Brown and Hamilton 2006a	Noble Ellenburg, NY (09)	Jain et al. 2010c
Castle River, Alb (02)	Brown and Hamilton 2006a	Noble Wethersfield, NY	Jain et al. 2011a
Cedar Ridge, WI (09)	BHE Environmental 2010	NPPD Ainsworth, NE	Derby et al. 2007
Cedar Ridge, WI (10)	BHE Environmental 2011	Oklahoma Wind Energy Center, OK	Piorkowski and O'Connell 2010
Cohocton/Dutch Hill, NY (09)	Stantec 2010	Pebble Springs, OR	Gritski and Kronner 2010b
Cohocton/Dutch Hills, NY (10)	Stantec 2011	Pine Tree, CA	BioResource Consultants 2010
Combine Hills, OR	Young et al. 2006	Pioneer Prairie I, IA (Phase II)	Chodachek et al. 2012
Combine Hills, OR (11)	Enz et al. 2012	PrairieWinds ND1 (Minot), ND	Derby et al. 2011c
Condon, OR	Fishman Ecological Services 2003	PrairieWinds ND1 (Minot), ND (11)	Derby et al. 2012c
Crescent Ridge, IL	Kerlinger et al. 2007	PrairieWinds SD1, SD	Derby et al. 2012d
Criterion, MD (11)	Young et al. 2012a	Prince Wind Farm, Ont (06)	Natural Resource Solutions 2009
Criterion, MD (12)	Young et al. 2013	Prince Wind Farm, Ont (07)	Natural Resource Solutions 2009
Crystal Lake II, IA	Derby et al. 2010a	Prince Wind Farm, Ont (08)	Natural Resource Solutions 2009
Diablo Winds, CA	WEST 2006, 2008	Red Canyon, TX	Miller 2008
Dillon, CA	Chatfield et al. 2009	Red Hills, OK	Derby et al. 2013b
Dry Lake I, AZ	Thompson et al. 2011	Ripley, Ont (08)	Jacques Whitford 2009
Dry Lake II, AZ	Thompson and Bay 2012	Ripley, Ont (Fall 09)	Golder Associates 2010
Elkhorn, OR (08)	Jeffrey et a. 2009b	Rugby, ND	Derby et al. 2011b
Elkhorn, OR (10)	Enk et al. 2011b	San Gorgonio, CA	Anderson et al. 2005
Elm Creek, MN	Derby et al. 2010c	Searsburg, VT (07)	Kerlinger 2002a
Elm Creek II, MN	Derby et al. 2012b	Shiloh I, CA	Kerlinger et al. 2009
Erie Shores, Ont	James 2008	Shiloh II, CA	Kerlinger et al. 2010b
Foote Creek Rim, WY (Phase I; 99)	Young et al. 2003a	SMUD Solano, CA	Erickson and Sharp 2005
Foote Creek Rim, WY (Phase I; 00)	Young et al. 2003a	Stateline, OR/WA (02)	Erickson et al. 2004
Foote Creek Rim, WY (Phase I; 01-02)	Young et al. 2003a	Stateline, OR/WA (03)	Erickson et al. 2004
Forward Energy Center, WI	Grodsky and Drake 2011	Stateline, OR/WA (06)	Erickson et al. 2007
Fowler I, IN (09)	Good et al. 2011	Stetson Mountain I, ME (09)	Stantec 2009c
Fowler I, II, III, IN (10)	Good et al. 2011	Stetson Mountain I, ME (11)	Normandeau Associates 2011
Fowler I, II, III, IN (11)	Good et al. 2012	Stetson Mountain II, ME (10)	Normandeau Associates 2010

Appendix A3 (*continued*). All post-construction monitoring studies, project characteristics, and select study methodology.

Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Fowler I, II, III, IN (12)	Good et al. 2013	Summerview, Alb (06)	Brown and Hamilton 2006b
Fowler III, IN (09)	Good et al. 2011	Summerview, Alb (08)	Baerwald 2008
Goodnoe, WA	URS Corporation 2010a	Tehachapi, CA	Anderson et al. 2004
Grand Ridge I, IL	Derby et al. 2010g	Top of Iowa, IA (03)	Jain 2005
Harrow, Ont (10)	Natural Resource Solutions 2011	Top of Iowa, IA (04)	Jain 2005
Harvest Wind, WA (10-12)	Downes and Gritski 2012a	Tuolumne (Windy Point I), WA	Enz and Bay 2010
Hay Canyon, OR	Gritski and Kronner 2010a	Vansycle, OR	Erickson et al. 2000
High Sheldon, NY (10)	Tidhar et al. 2012a	Vantage, WA	Ventus Environmental Solutions 2012
High Sheldon, NY (11)	Tidhar et al. 2012b	Wessington Springs, SD (09)	Derby et al. 2010f
High Winds, CA (04)	Kerlinger et al. 2006	Wessington Springs, SD (10)	Derby et al. 2011d
High Winds, CA (05)	Kerlinger et al. 2006	White Creek, WA (07-11)	Downes and Gritski 2012b
Hopkins Ridge, WA (06)	Young et al. 2007	Wild Horse, WA	Erickson et al. 2008
Hopkins Ridge, WA (08)	Young et al. 2009c	Windy Flats, WA	Enz et al. 2011
Jersey Atlantic, NJ	NJAS 2008a, 2008b, 2009	Winnebago, IA	Derby et al. 2010e
Judith Gap, MT (06-07)	TRC 2008	Wolfe Island, Ont (May-June 09)	Stantec Ltd. 2010a
Judith Gap, MT (09)	Poulton and Erickson 2010	Wolfe Island, Ont (July-Dec 09)	Stantec Ltd. 2010b
Kewaunee County, WI	Howe et al. 2002	Wolfe Island, Ont (Jan-June 10)	Stantec Ltd. 2011a
Kibby, ME (11)	Stantec 2012	Wolfe Island, Ont (July-Dec 10)	Stantec Ltd. 2011b
Kittitas Valley, WA (11-12)	Stantec Consulting 2012	Wolfe Island, Ont (Jan-June 11)	Stantec Ltd. 2011c
Klondike, OR	Johnson et al. 2003	Wolfe Island, Ont (July-Dec 11)	Stantec Ltd. 2012

Whooping Crane Habitat Review
Sunflower Wind Project
Morton and Stark Counties, North Dakota

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NATURAL RESOURCES ◆ SCIENTIFIC SOLUTIONS

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INTRODUCTION

The Sunflower Wind Project (SFWP) is proposed for development by Sunflower Wind Project LLC (Sunflower), a wholly owned subsidiary of Infinity Wind Power (Infinity), in Morton and Stark Counties, North Dakota. Sunflower requested that Western EcoSystems Technology, Inc. (WEST) implement a desktop review and analysis of potential whooping crane habitat resources within the SFWP and to compare these resources to areas outside of the project boundary to the north, south, east, and west. The habitat review and analysis evaluates whether or not the proposed SFWP area represents high, average, or low potential whooping crane habitat as compared to alternate locations. From this analysis all parties can then discuss what impacts there may be to whooping cranes from development of the SFWP.

PROJECT AREA

The SFWP is located in Morton and Stark Counties, North Dakota, approximately three miles (mi; 4.8 kilometers [km]) south of the town of Hebron (Figure 1). The SFWP, currently about 21,947 acres (ac; 89 square kilometers [km2]; 34 square miles [mi2]) is located in west-central North Dakota and more specifically western Morton and eastern Stark Counties. The landscape within the SFWP is generally flat with more rolling lands in the northern third of the project area. Elevation ranges from 679 meters (m; 2,228 feet [ft]) to 817 m (2,679 ft). Historically, the SFWP's landscape was dominated by grasslands but has since been converted largely to agricultural use with crop production and livestock grazing the primary practices. Trees and shrubs can be found around farmsteads, within planted shelter belts, and along/within drainages. Wetlands are scattered throughout the SFWP with many being man-made.

Cultivated cropland and herbaceous/pasture/hay lands are approximately equal in amount and comprise almost 95% of the study area. Of the remaining 5%, 3.5% is developed while wetlands, forest, and barren lands, in that order, make up the rest of the landscape (Fry et al. 2011; Figure 2). Common agricultural crops include small grains, corn, sunflowers, and alfalfa.

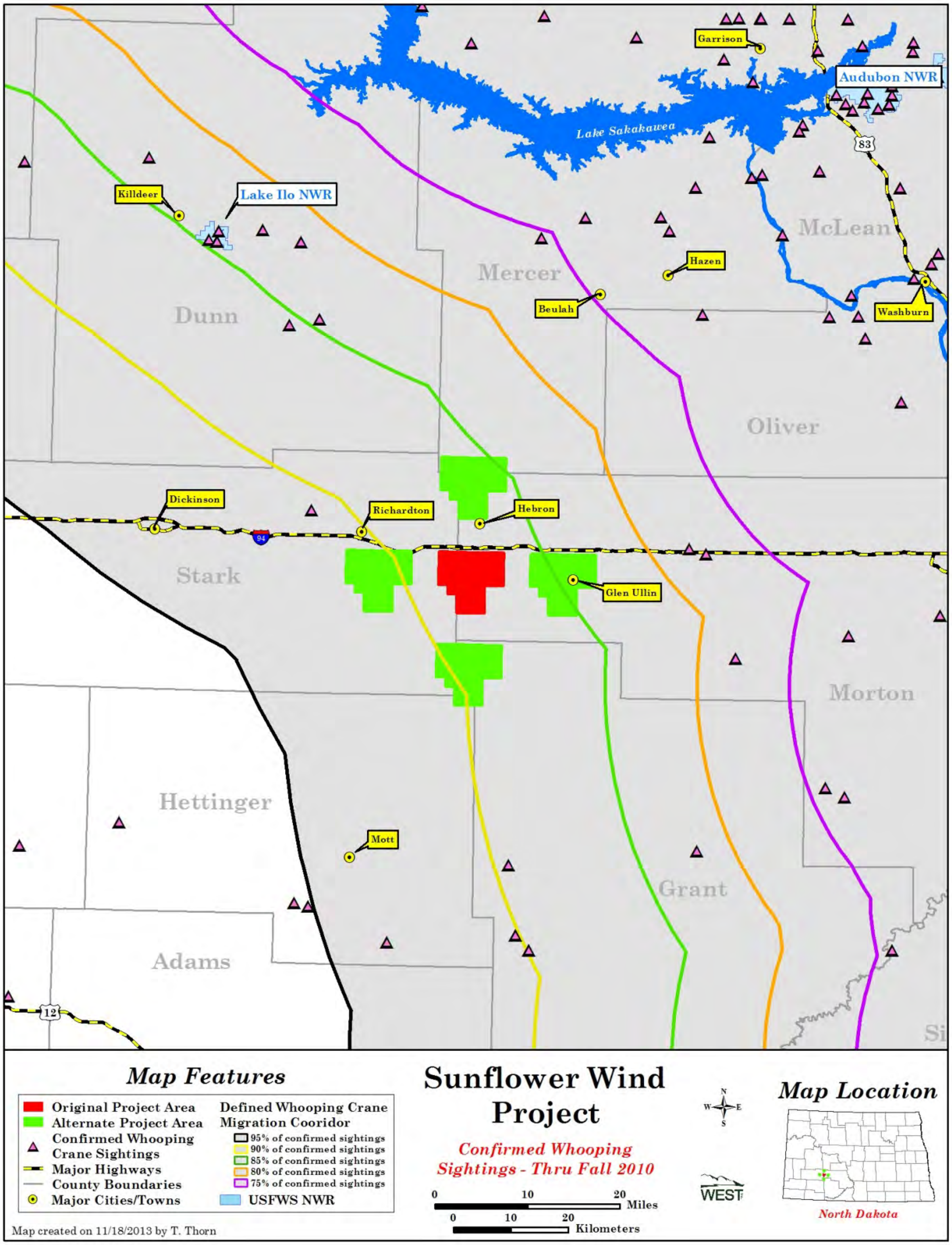

Figure 1. Location of the Sunflower Wind Project, alternate areas, and whooping crane observations.

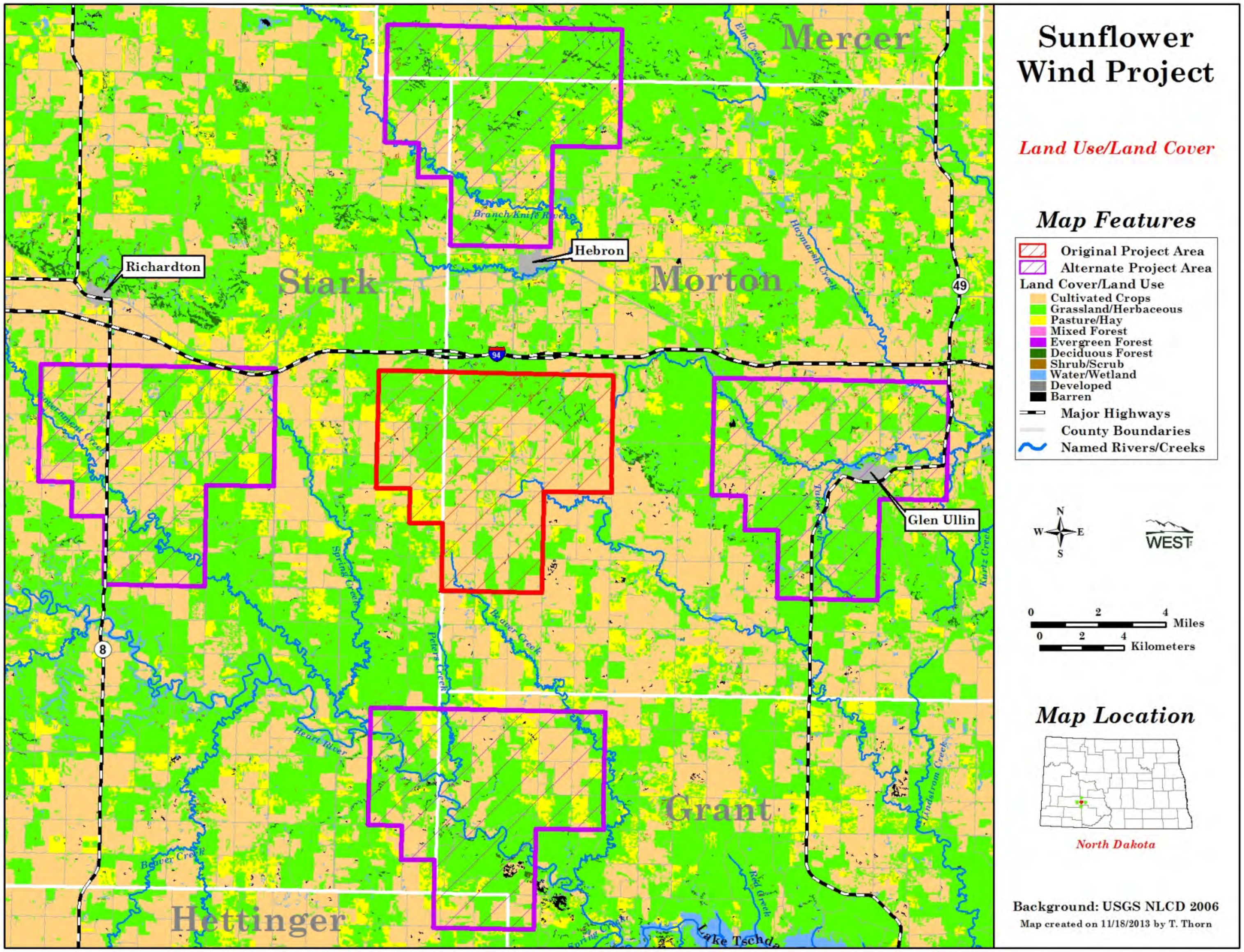

Figure 2. Land Use/Land Cover within and around the Sunflower Wind Project.

METHODS

A desktop review was completed using ArcGIS, ArcMap 10.1, land cover information from the National Land Cover Database (NLCD 2006), wetland data from the National Wetland Inventory (NWI), 2012 NAIP aerial imagery, and the current project boundary as provided by Sunflower. A site visit was not completed by WEST for this exercise specifically, but WEST has conducted other surveys at the SFWP and confirmed that the mapping generally agrees with current conditions.

The potential whooping crane habitat analysis included a comparison of land cover within the proposed SFWP boundary and four alternate areas of the same dimensions located adjacent (based on the SFWP's boundary extent) to the SFWP boundary in the four cardinal directions (see Figures 1, 2, and 3). A recently developed potentially suitable habitat assessment (Watershed Institute 2012) was also used to quantify and compare whooping crane habitat within the study areas. This assessment first screens all wetlands within the study areas for minimum size, visual obstructions, and disturbances. Those wetlands left are then quantified by their size, density of wetlands around them, distance to food, whether they are natural or man-made, and their water regime as a means to quantify suitability. This work was initially done in Kansas and the results were compared to Quivira National Wildlife Refuge, a traditional migratory stopover area. In Kansas, it was determined that a score of 12 or higher represented potentially suitable whooping crane habitat.

RESULTS

There are 10,494 ac of cropland within the proposed project area, or 47.7% of the total area. Grass and herbaceous lands make up approximately 40.8% of the project area while pasture/hay and developed lands occupy another 6.3% and 3.5% respectively. Water, forest, shrub/scrub, and barren habitats comprise the remaining 1.7% of the SFWP (Table 1).

Croplands, Grasslands, and Other Habitats

The percentage of cropland varied between the project area and comparison areas, with the SFWP containing the most (47.7%) and the north comparison area the least (25.2%; Table 1). The other three reference areas had cropland percentages ranging between 31.4% and 43.9% (Table 1). All cropland has the potential as foraging areas for whooping cranes but crop type could influence the extent of use of a particular field during any one migration season.

Percentages of grassland/herbaceous habitat also varied between analyzed areas with the north (62.1%) reference area having the most and the SFWP and west area the least (40.8% and 38.2% respectively; Table 1). The east and south reference areas had grassland/herbaceous percentages approximately in the middle of the high and low percentages calculated (Table 1). The influence of grassland habitats on migrating whooping crane behavior is unknown; however, short grasslands (i.e. grazed pasture) adjacent to wetlands may provide loafing areas and cranes may utilize grasslands to some degree for foraging.

All other habitat types comprised approximately 11.5% of the SFWP's area. This is at the low end of the range (11.3% - 17.9%) of other habitats occurring within the alternate areas (Table 1). Pasture/hay and developed lands made up the bulk of the remaining habitats in all areas (Table 1).

Table 1. Land Use/Land Cover within the Sunflower Wind Project and adjacent areas.

	SFWP		North		East		South		West	
Habitat Type	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Cultivated Crops	10,493.8	47.7	5,540.7	25.2	8,407.4	38.3	6,902.7	31.4	9,648.4	43.9
Grassland/Herbaceous	8,965.4	40.8	13,646.3	62.1	11,032.6	50.2	11,755.9	53.5	8,406.0	38.2
Pasture/Hay	1,394.8	6.3	1,460.6	6.6	566.6	2.6	1,818.2	8.3	2,701.6	12.3
Developed	761.9	3.5	374.9	1.7	1,144.6	5.2	753.5	3.4	901.8	4.1
Water/Wetlands	188.0	0.9	308.0	1.4	454.7	2.1	343.8	1.6	248.4	1.1
Forests	108.4	0.5	541.2	2.5	197.8	0.9	267.9	1.2	57.6	0.3
Shrub/Scrub	62.8	0.3	91.2	0.4	105.7	0.5	34.1	0.2	18.5	0.1
Barren	8.2	<0.1	20.5	0.1	6.5	<0.1	9.1	<0.1	4.5	<0.1

National Land Cover Database 2006; Fry et al. 2011.

Wetlands

NWI wetland data was used for this analysis because it represents wetland features to a higher degree than the NLCD. For this analysis, it is assumed that all wetlands are potential whooping crane roosting areas under one water regime or another (e.g., drought, normal, or flood). The SFWP had the second lowest number, total acres, mean size, and size range of wetland basins compared to the reference areas (Table 2). The west reference area had the highest number of basins (194), total acres (393.6 ac) and largest size range (<0.1 to 200 ac). Wetland basins within the west area also had the second highest mean size (Table 2). The south reference area had the fewest number of wetland basins (61) but largest wetland mean size (4.1 ac; Table 2). These numbers are somewhat misleading due to the presence of the Heart River bisecting this reference area (Figure 3). The Heart River was one basin accounting for approximately 175 of the 250 total wetland acres within the area. The northern study area had the second highest number of wetland basins (164) but the lowest total wetland acres, smallest mean wetland size (0.6), and narrowest wetland size range (<0.1 to 5.0; Table 2). For the east reference area, the numbers for the four wetland statics were in the middle compared to the other reference areas and the SFWP (Table 2).

Freshwater emergent (52.8%) and freshwater ponds (44.4%) made up the highest percentages of wetland types in the SFWP, with freshwater forested/shrub and other wetlands making up the remaining approximately 2.8% of wetlands (Table 3). The north reference area had similar wetland types and percentages as the SFWP with a small amount of riverine and other wetlands (Table 3). Almost 70% of the south alternate area was comprised of riverine wetlands due to the presence of the Heart River. The bulk of the wetland types composing the east reference area were freshwater ponds (45.9%) and lakes (39.6%) while freshwater emergent wetlands dominated (93.2%) the type of wetlands in the western study area (Table 3). See Figure 3 for distribution of wetland types within the analyzed areas.

To summarize, the SFWP had the second lowest number, total acres, mean size, and size range of wetland basins compared to the reference areas and was dominated by freshwater emergent wetlands and ponds. The west alternate area had the highest number, total acres, and widest size range of wetlands of all the areas with the bulk of the wetlands being freshwater emergent. The north reference area had a relatively high number of freshwater emergent wetlands and freshwater ponds but they were small in size. The south study area contained the fewest wetland basins but these wetlands had the highest mean size. The Heart River, represented by a single riverine basin, comprised approximately 70% of the total wetland acres of this area. Wetland statistics for the east alternate area were basically in the middle of range for all study areas. This area was the only one to contain any NWI lake habitat.

Table 2. Comparison of the number of wetland basins and mean size within the Sunflower Wind Project and adjacent areas.

Area	Basins	Total - acres	Mean Size - acres	Range - acres
SFWP	126	110.3	0.9	0.1 – 28.4
North	164	106.3	0.6	<0.1 – 5.0
South	61	250.0	4.1	0.1 – 174.6
East	139	206.7	1.5	0.1 – 38.9
West	194	393.6	2.0	<0.1 – 200.0

Data Source: NWI data with wetland parts dissolved.

Table 3. Wetland types within the Sunflower Wind Project and adjacent areas.

	SFWP		North		East		South		West	
Wetland Type	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Freshwater Emergent	58.2	52.8	43.5	41.0	28.7	13.9	48.2	19.3	366.7	93.2
Freshwater Forested/Shrub	0.9	0.8			0.5	0.2	10.0	4.0	4.0	1.0
Freshwater Pond	48.9	44.4	61.4	57.8	94.9	45.9	18.6	7.4	22.2	5.6
Riverine			0.2	0.2			173.1	69.3		
Lake					81.8	39.6				
Other	2.3	2.1	1.1	1.0	0.7	0.3	0.1	<0.1	0.4	0.1

Data Source: NWI 2010.

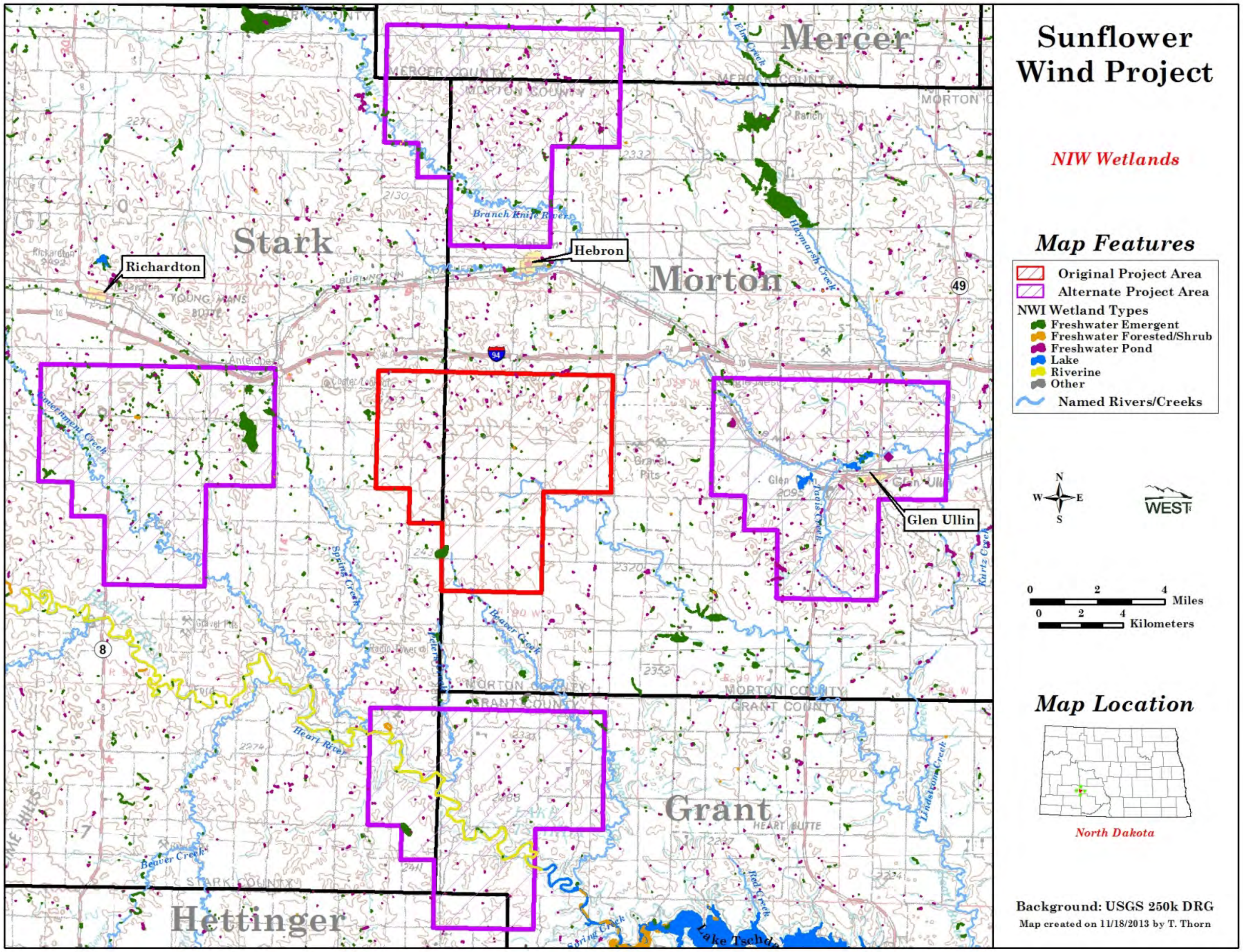

Figure 3. NWI wetlands within and around the Sunflower Wind Project.

Whooping Crane Suitable Habitat Assessment

The habitat assessment model identified 74 wetland basins within the SFWP as potentially suitable whooping crane roosting habitat. The mean suitability score for these wetlands was 8.5 with the scores ranging from four to 13 (Table 4). This mean suitability score and range was similar to the score and range for the four reference areas. The west reference area had the highest (9.0) mean suitability score (Table 4). The overall rankings are generally below what was determined as suitable potential habitat in Kansas (a mean score of 12 or more; Watershed Institute 2012).

Table 4. Comparison of suitable whooping crane habitat within the Sunflower Wind Project and adjacent areas.

Area	Basins	Total - acres	Mean Score	Score range
SFWP	74	91.7	8.5	4 – 13
North	68	66.9	8.2	5 – 11
South	34	39.8	8.1	6 – 13
East	54	102.9	8.6	6 – 14
West	54	274.8	9.0	7 – 14

Data Derived From: Potentially Suitable Habitat Assessment, Watershed Institute 2012.

Whooping Crane Migration Corridor and Confirmed Sightings

The SFWP and all four review areas are located inside the defined (95% of confirmed sightings) whooping crane migration corridor and no whooping cranes have been documented within these areas (CWCTP 2009; Figure 1). The closest confirmed sighting (through fall 2010) to the SFWP is approximately 15 mi (24.1 km) northwest of the boundary (Figure 1). This same sighting is approximately 6 mi (9.7 km) from the west alternative's boundary (Figure 1). It should be noted that reported whooping crane observations are mostly random events by the public or focused around refuges and other areas of management interest and not the result of a systematic search. Therefore, just because an area has no documented whooping crane sightings, does not mean that birds do not use the area.

DISCUSSION

Whooping cranes are currently listed as endangered under the Endangered Species Act (32 FR 4001, 1967 March 11) except where nonessential experimental populations exist (66 FR 33903-33917, 2001 June 26; 62 FR 38932-38939, 1997 July 21; and 58 FR 5647-5658, 1993 January 22). In the US, the whooping crane was listed as threatened with extinction in 1967 and endangered in 1970 – both listings were "grandfathered" into the Endangered Species Act of 1973 (ESA 1973). The 2012 – 2013 winter population within the primary wintering grounds was estimated at 257 birds (178 – 362, 95% confidence interval.). There was another 22 whooping cranes thought to be outside of the primary wintering grounds when systematic surveys were conducted (USFWW 2013). Whooping cranes typically migrate from their breeding grounds in Wood Buffalo National Park, Canada to their wintering areas in Aransas National Wildlife Refuge, Texas. During the migration, most birds pass through central North Dakota.

The US Fish and Wildlife Service (USFWS) defined a migration corridor for whooping cranes based on the historical sightings of whooping cranes from the early 1960’s through 2009 (CWCTP 2009). This corridor encompasses approximately 95% of the observations and is sub-divided into 5% increments starting at 75%. The SFWP is within the area encompassing 85% to 90% of confirmed whooping crane sightings and is approximately 71 mi (114.2 km) west of the migration corridor centerline (CWCTP 2009; Figure 1). The USFWS has expressed concern with wind and other above ground developments (e.g., transmission lines) that are built anywhere within the defined corridor, but with more emphasis placed on those projects within the region that encompasses 75% of the observations.

Confirmed whooping sightings to the north and south of the project indicates the potential for whooping cranes to fly through the area during migration. Whooping cranes generally migrate at 305-1830 m (1,000-6,000 ft) altitude, well above turbine height (Stehn 2007), and thus for the most part are unlikely to collide with turbines. However, as whooping cranes ascend and descend during takeoff and landing, or migrate during inclement weather, they may fly at lower altitudes and may fly at altitudes corresponding to the rotor-swept areas. In summary, low altitude flight is generally of short duration in the morning and evenings with more time and distance covered at higher elevation during typical migration flight; reducing potential risk to whooping cranes.

No whooping cranes have been reported as being killed or injured by wind turbines (NWCC 2004), but one sandhill crane (*Grus canadensis*) was reported at the Altamont wind energy facility in California (Smallwood and Karas 2009), it is unclear if this was a result of turbine collision or collision with a power line. Two sandhill cranes were also apparently struck by turbines during a recent study of wintering cranes in Texas (Navarrete and Griffis 2011a). It appears that cranes are not overly susceptible to collision with turbines given that 100,000’s sandhill cranes migrate twice annually through the Great Plains and none have been documented as wind turbine collision fatalities in this region during migration (Derby et al. 2012).

Besides direct mortality, concern has also been raised regarding potential displacement impacts that wind facilities may have on whooping cranes. For example, if whooping cranes avoid wind facilities, the likelihood of impacts with turbines is further decreased but the availability of habitat in the project area may be diminished, causing cranes to have to fly further to find suitable habitat to roost and forage. To date, very little quantitative data is available to help address displacement impacts on whooping cranes or sandhill cranes. A recent presentation by Navarrete and Griffis (2011b) suggests that the mean density of sandhill cranes wintering in the high plains of Texas increased the further away from studied wind facilities and this distribution was not a random event. It is unclear if a similar pattern is found in cranes during migration or at other wintering areas.

Although developed for transmission line impacts on whooping crane habitat in Kansas, the Watershed Institute's (2012) potentially suitable habitat assessment for whooping cranes can help to quantify potential whooping crane habitat in and around a proposed wind energy project. This tool indicates that the range of scores and average score at the SFWP is similar to the four other study areas, indicate that overall the site is not unique in providing potential habitat for the species during migration. In addition, the average score and most of the individual wetland scores are much lower than the reference score of 12 developed for quality habitat at the Quivira National Wildlife Refuge.

SUMMARY

In analyzing the potential for significant impacts from wind development on whooping crane stopover habitat, Stehn (2007) suggests assessing whether there is "lots of suitable stopover habitat in the general area … or is the proposed wind farm site the only suitable whooping crane stopover habitat for miles around". This issue was investigated by comparing the potential whooping crane stopover habitat (using wetlands as this indicator) in the project area to surrounding (in the four cardinal directions) areas of the same dimensions, located adjacent (based on the BWP's boundary extent) to the BWP boundary. A Geographic Information System (GIS) was used to calculate the amount of the various habitats and in the case of wetlands, number of individual basins and their type, in each of the areas compared to the proposed SFWP (Tables 1, 2, and 3). This analysis shows that both roosting (i.e. wetlands) and foraging (i.e. croplands) habitats are available in the SFWP and alternate areas. Potential whooping habitat within the SFWP appears to be most similar to that in the east and west reference areas and more suitable than that found in the north and south alternate areas. Based on results from suitable habitat assessment, potential whooping crane use wetlands are similar in attractiveness in all studied areas with the SFWP having the most potential basins (Table 4). While whooping cranes likely migrate over the SFWP and there is potential for roosting or foraging use at the SFWP, the SFWP does not provide significant potential habitat nor does it provide unique habitat compared to adjacent areas.

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Appendix D
Other Studies

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APPENDIX D OTHER STUDIES

CONTENTS:

- Critical Issues Analysis
- Microwave Beam Path Analysis
- Aviation Constraints Report
- Class III Cultural Survey Report (Confidential—included as a separate submittal)

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Sunflower Wind Project
Critical Issues Analysis

Infinity Wind Power

January 2011

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1.0 INTRODUCTION

1.1 BACKGROUND

Sunflower Wind Project, LLC, a wholly owned subsidiary of Infinity Wind Power (Infinity) contracted HDR Engineering, Inc. (HDR) to prepare a critical issues analysis (CIA) for a proposed utility-scale wind energy project – the Sunflower Wind Project – located in west central North Dakota. This CIA identifies potential development constraints on the proposed project related to publicly available data on biological, archaeological, cultural, historical, surface hydrological resources, and land use within a study area defined by Infinity. The CIA is based on a desk-top evaluation of the environmental characteristics of the study area. The information presented in the analysis was obtained from the following:

- ESRI ArcGIS online aerial imagery, streets, and basemap information
- United States Geological Survey (USGS) streams and rivers data
- Public lands data: federal lands, state lands, and county lands
- Municipalities and counties
- USGS GAP analysis land cover data
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps
- USFWS county-level species information
- Federal Aviation Administration (FAA) registered airports data
- Department of Defense (DOD) Preliminary Screening Tool
- Federal Communications Commission tower data
- USGS topographic maps and digital elevation data
- U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) data
- North Dakota Department of Transportation data
- North Dakota Geological Survey data
- North Dakota State Water Commission data
- North Dakota GIS Hub data

The final section of this CIA discusses permits and approvals that may be necessary for construction of the project. Figures are presented after the permits and approvals matrix. Appendix A contains the Department of Defense Preliminary Screening Tool results for the study area. Economic coal deposit maps are found in Appendix B. Appendix C contains the North American Breeding Bird Survey results for the study area vicinity.

1.2 PROJECT LOCATION

The 15,600-acre study area lies within Morton and Stark counties, North Dakota. The nearest communities to the study area include Hebron to the north, Glen Ullin to the east, and Richardton to the west (see Figure 1). Table 1 lists the townships and sections within the study area. Townships are not organized into civil townships; civil townships are common in several parts of North Dakota, and often require additional permitting.

Table 1. Counties, Townships and Sections within Project Study Area

Township	Range	Section
138N	90W	4-6
138N	91W	1,2
139N	90W	16-23, 26-33
139N	91W	23-25, 35, 36

1.3 Population Information

Table 2 presents population information obtained from the U.S. Census Bureau 2000 Census and 2009 Census Estimates for the municipalities and small towns near the study area. Hebron is the nearest community, located 2 miles north. Glen Ullin and Richardton are located 7 miles and 8 miles from the study area, respectively.

Table 2. Population Estimates for Counties, Cities, and Townships near the Study Area

County/Township/Town	2000 U.S. Census Population	2009 U.S. Census Estimate
Morton County	25,303	26,464
Stark County	22,636	22,247
Hebron	803	725
Glen Ullin	865	796
Richardton	619	577

2.0 ENVIRONMENTAL CHARACTERISTICS

2.1 Land Use

Stark and Morton counties' primary land use is agricultural. Typical crops include wheat, hay, barely, oats, and corn. Raising livestock (cattle, hogs, sheep, and horses) is another important land use. More information on agriculture is included in the Land Cover section below.

Land Cover

According to GAP land cover data (Figure 3) the study area is a mixture of cropland with interspersed rangeland made up of fallow parcels (classified in the GAP data as planted herbaceous perennials) or grassland/prairie. Grassland/prairie is mostly associated with steeper terrain. Rangeland in these areas is not likely to have ever been tilled. Riparian areas are likely to contain shrubs and small trees. Wetland basins are common but most are less than five acres and support only seasonal surface water. Most streams within the study area are intermittent and, in many cases, function as drainageways within tilled agricultural fields. Table 3 shows the acreages of each land cover type based on GAP data.

Table 3. Gap Analysis

Cover Type	Total (Acres)*	Percentage of Study Area
Cropland	5,645	36.3
Grassland/Prairie	4,474	28.8
Planted Herbaceous Perennials	4,195	26.9
Shrubland	489	3.2
Barren	274	1.8
Wetlands	216	1.4
Woodland	213	1.3
Developed	49	0.3
Total	**15,555**	**100.0**

** Rounded to nearest acre.*

Public Lands

- Public and private parks and trails (Figure 2):
    - There are no public or private parks within the study area. A cemetery is located in the southwestern corner of the study area in Section 2 of Township 138N, Range 91W.
    - There are no designated multi-use or snowmobile trails in Stark or Morton counties (State of North Dakota 2009).
- **USFWS Easements**—USFWS administers a program by which it holds easements on private lands that have wetlands and/or grassland habitat. Development may be restricted on lands held in a USFWS easement. As the USFWS does not provide specific easement data to the public; consultation regarding possible easements on private lands that have documented wetlands or grassland is recommended.
- **Programmatic Environmental Impact Statement**—Western Area Power Administration (WAPA) and the USFWS are in the process of preparing a Programmatic Environmental Impact Statement (PEIS). This document is intended to identify potential environmental impacts associated with wind energy development and associated transmission systems; to identify mitigation strategies, standard construction practices, and best management practices to reduce potential impacts; and to establish a comprehensive environmental program for evaluating future wind-energy proposals. The draft PEIS is scheduled to be published in fall 2010 and a Record of Decision is to be published in 2011. Once finalized, developers can expect that avoidance, minimization, and mitigation measures identified in the PEIS will be required for all wind projects that occur on USFWS easement lands. Currently, there is a process (through providing a reversionary clause) for allowing wind development on USFWS grassland easements. However, this process requires extensive coordination and a project-specific review under the National Environmental Policy Act.
- **Wetland Management Districts (WMDs)** – No WMDs are located in or within 5 miles of the study area. WMDs are lands purchased by the U.S. Bureau of Reclamation (Reclamation) as part of North Dakota's Garrison Diversion Unit. Reclamation developed these areas for wildlife by restoring drained wetlands and planting cropland acres to grassland. The WMDs were transferred to the USFWS to be managed primarily for the production of migratory birds and for

public use. The closest WMD is located 21 miles southwest of the study area in Hettinger County.

- **Wildlife Management Areas (WMAs)**—WMAs are state-owned lands managed by the North Dakota Game and Fish Department (NDGFD) for wildlife habitat. There are no WMAs in or within 5 miles of the study area. The closest is the Storm Creek WMA in Morton County located 18 miles east of the study area. The Heart Butte Reservoir State Game Management Area is not a WMA, but is managed by the NDGFD and is located 16 miles southeast of the study area. This area is a reservoir used for fishing and hunting.
- **Bureau of Land Management (BLM) Recreational Areas** – The Schnell Recreation Area is located 9 miles west of the study area. The recreation area is a converted ranch that provides rustic camping, wildlife viewing, and environmental education opportunities.
- **State Trust Lands**—No state trust land parcels exist within the study area. One state trust land parcel is within 2 miles of the study area (Figure 2). Trust lands are administered by the North Dakota State Land Department.
- **Private Land Open to Sportsman (PLOTS)** — No PLOTS are located in or within 0.5 miles of the study area. These are private lands that are open to public hunting. These lands are enrolled in one of three NDGFD programs to enhance fish and wildlife populations for sustained public use. These lands may be jointly enrolled in other federal programs such as the Conservation Reserve Program described below.
- **Natural Resources Conservation Service (NRCS) Conservation Reserve Program (CRP)**—Under CRP, landowners are compensated for taking agricultural land out of production for a set contract period for which payments are made on a per-acre basis. While wind development is allowed within CRP parcels, coordination with landowners and the NRCS is necessary to withdraw the impacted areas from the CRP contract and to compensate the NRCS for any payments already distributed for those areas. HDR recommends contacting the NRCS Beulah Field Office to identify which lands are enrolled in CRP; permission from the individual landowner of each parcel is required to gain access to CRP data.
- **U.S. Department of Agriculture (USDA) Loan Coordination**—The study area is located with in a rural agricultural area. Land under loans from the USDA requires special coordination with the USDA if project activities are proposed within those parcels; this coordination can include a modified National Environmental Policy Act (NEPA) review. HDR recommends contacting the USDA to identify which lands have loans from the USDA; permission from the individual landowner of each parcel is required to gain access to USDA loan data.

2.2 PUBLIC SERVICES AND INFRASTRUCTURE

Figure 1 shows roads and railroads in the study area. Airports within a 25-mile radius are shown in Figure 4. Figure 5 shows the locations of Federal Communication Commission (FCC)-licensed towers and existing transmission lines.

- **State, county, and local roads**—Figure 1 shows state and county roads within the study area. Roads in the study area follow section lines. A transportation assessment should be completed to evaluate potential access routes and identify improvements necessary to facilitate project construction and operation. Stark and Morton counties and the North Dakota Department of Transportation (NDDOT) may require highway crossing permits for any utility crossings of county roads. The North Dakota Public Service Commission (PSC) has voluntary turbine fall-down setbacks from public roads. Stark and Morton counties have not established any setbacks specific to wind development.

- **Airports and Heliports**—There are two public airports and four private airports within 25 miles of the study area (Table 4). Setbacks from public and private airports follow North Dakota Aeronautics Commission and FAA requirements. The North Dakota Aeronautics Commission has provided guidance on other wind projects related to safety for crop dusting aircraft to decrease their risk of colliding with anemometers and turbines.

Table 4. Public/Private Airports within 25 Miles of the Study Area

Airport Name	Type	Distance from the Study Area (miles)
Chase Airstrip	Private	4
Glen Ullin Regional	Public	6
Richardton	Public	11
Brands	Private	15
Fitterer's Strip	Private	16
Jurgens Airstrip	Private	17

- **Railroads**— An east/west rail line, operated by Burlington Northern Santa Fe Railway, runs to the north and east of the study area crossing Highway 94 (Figure 2).
- **Pipelines**—No interstate pipelines have been identified within the study area.
- **Transmissions lines** —A 230 kV transmission line parallels Highway 94 through the northern portion of the study area (Figure 5).
- **FCC Towers –** Two private land-mobile communication towers are located within the study area (Township 139N, Range 90W, Sections 20 and 32). One microwave transmission tower is located within the study area (Township 139N, Range 90W, Section 21). Seventeen registered microwave towers are located on a large hill 1.5 miles west of the study area (Township 139N, Range 91W, Section 16). The presence of a microwave tower within the study area and the proximity of a large array of microwave towers increase the likelihood that the study area will contain microwave beam paths. HDR recommends completing a microwave beam path analysis to determine their presence in the study area.

Military Facilities, Aviation and Weather Radar

The FAA's online *Department of Defense (DoD) Preliminary Screening Tool* (DoD Tool)[1] allows developers to gain preliminary insights regarding potential impacts that structures may have on long range radars, military training routes, and special use airspace prior to official filing of an Obstruction Evaluation/Airport Airspace Analysis request with the FAA. This tool does not replace any official processes or procedures that may be required by the FAA.

The Long Range Radar Screening type produced the following results:

- **Green**: No anticipated impact to Air Defense and Homeland Security radars. Aeronautical study required.

The NEXRAD screening type produced the following results:

[1] FAA Disclaimer: The DoD Preliminary Screening Tool enables developers to obtain a preliminary review of potential impacts to Long Range Radar(s), Military Training Route(s), and Special Use Airspace prior to official OC/AAA filing. This tool will produce a map of the structure and nearby military airspace or Long Range Radars. The use of this tool is **100% optional** and will provide a first level of feedback and a single point of contact within DoD to discuss impacts/mitigation efforts on the military training mission. **The use of this tool does not in any way replace the official FAA process/procedures.**

- **Green**: Minimal to no impact to Weather Surveillance Radar-1988 Doppler (WSR-88D) weather radar operations. National Telecommunications & Information Administration (NTIA) notification advised.

The Military Operations screening type produced the following results:

- The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Dr. Thomas (Thom) H. Rennie at the USAF Regional Environmental Coordinator at (214) 767-4678 for confirmation and documentation.

2.3 CULTURAL RESOURCES

Archaeological and Historic Facility Resources

Archaeological and historic facility resources represent the visible or otherwise tangible record of human activity on the landscape. These resources vary in size, shape, condition, and importance, among other considerations; some are clearly evident on the landscape, while others are buried or only visible to knowledgeable people.

Records were reviewed through the National Register of Historic Places (NRHP) online database which can be accessed at http://www.nps.gov/history/nR/research/. This database was used as an initial search to see if any NRHP listed resources were in or near the study area.

It is anticipated that this project falls under multiple state statutes encompassed in the North Dakota Century Code, including:

- 55-03-01, which requires permits to investigate, evaluate, or mitigate adverse effects on cultural resources, historic buildings, structures, or objects under section 106 of the National Historic Preservation Act of 1966.
- 55-03-01.1, which requires permits to investigate, excavate, or otherwise record cultural resources on land owned by instrumentality of the state of North Dakota and to excavate cultural resources on private land.
- 23-06-27, which outlines the protection of unmarked burials and the penalties for their disturbance.
- 55-02-07.1, which protects site locations of prehistoric or historic sites. This statute limits access to, and release of information from, files of the State Historical Society of North Dakota until the director is satisfied that the applicant has a reasonable need for the information and is assured that the release of the information will not result in unnecessary destruction of the resource.
- 55-1008(2), which offers protection to sites listed on the State Historic Sites Registry.

Resources are typically categorized by type and significance. The status of a resource is completed for compliance with federal regulations, typically Section 106 of the National Historic Preservation Act of 1966 (as amended) (NHPA), by applying the National Register Criteria for Evaluation developed by the National Park Service (Bulletin 15 completed by the staff of the National Register of Historic Places, finalized by Patrick W. Andrus, edited by Rebecca H. Shrimpton, 1990, Revised 1991, 1995, 1997, Revised for Internet 1995, 2001, 2002).

The status of a resource can fall into three possible categories: not eligible, not evaluated, and eligible. A cultural resource is determined "not eligible" when a federal agency has determined that it is not eligible for the NRHP. Such resources do not require further investigation. A cultural resource is considered "not evaluated" when a federal agency has not made any determination as to its eligibility. Further work is needed to understand the significance of the cultural resource. A cultural resource is considered "eligible" when a federal agency has determined it to be of value and significant enough to be listed on the NRHP. Coordination with the "appropriate parties" is needed to discuss project impacts as they relate to the resources.

Resource status is useful for project planning purposes. In addition, when resources have not been evaluated for significance and will be physically impacted by the project, coordination with State Historic Preservation Office (SHPO) to address the impacts will be needed.

Recorded Archaeological and Historic Facility Resources

The online NRHP database was searched for registered properties in Morton and Stark counties located in and within 1 mile of the study area. No NRHP registered archaeological or historic facility resources were found.

The absence of listed archaeological and/or historic facility resources does not mean the project area is clear of significant resources. It is possible there are both recorded and unrecorded resources in the project area that may be significant, but which have been neither evaluated nor had their status determined.

Possible Concerns or Effects

Possible concerns that should be considered for this project include:

- Unrecorded cultural resources located within the study area
- Any ground disturbing activity within the study area that has potential to impact known or unknown cultural resources
- Visual impacts to recorded or unrecorded cultural resource properties

Recommendations

No NRHP properties were identified in or near the study area. However, it is likely that unevaluated or unknown resources may be present within or near the project area that may be significant. To assist in initial development of a project layout, HDR recommends that a literature search be completed for the study area to identify previously recorded cultural resources. Additionally, HDR recommends that a field survey be completed in the study area prior to construction to identify unrecorded cultural resources that should be avoided. Typically, this includes a field survey for undiscovered cultural resources located (buried or on the surface) within the area that could potentially be directly disturbed by construction activities. Additionally, an evaluation of historic structures within the general project area is sometimes appropriate to inform project development.

If federal permits (e.g. USACE Section 404), federal funds, or federal review under NEPA is required or used in any part of this project, then Section 106 of the NHPA would be applicable. If Section 106 is applicable, a field survey (Phase I Field Inventory) and a formal determination of a resource's eligibility under the NRHP (Phase II Evaluation) will likely be required to consider both recorded and unrecorded above-ground resources.

Taking into consideration the types of climate, agricultural practice, and land use present in the study area, the most probable periods for completing field surveys for archaeological resources would be after spring thaw and before fall freeze, preferably before agricultural land becomes fully grown, or after agricultural land has been harvested. However, in area where the primary land use is range or pasture land, survey work could take place from spring thaw to fall freeze. An evaluation of historic structures can be completed at any time of the year, but seasons with minimal vegetation cover are more ideal.

2.4 GEOLOGIC AND GROUNDWATER RESOURCES

Elevation and Topography

Topography within the study area is slightly rolling to rolling, with the steepest topography occurring to the southwest (Figure 6). The elevation ranges from 2,231 feet (680 meters) to 2,362 feet (720 meters).

Geology and Groundwater

Surficial geology within the study area consists of glacial sediments deposited during the Holocene to Pre-Wisconsinan Period (Bleumle 1988, Clayton 1980). The primary deposits that define the study area are collapse/draped transition sediments. The glacial sediment is characterized by hummocky topography that has draped over and partially obliterated the topography existing before the glacial advance. An area of ring-shaped hummocks is located along the west end of the study area. The sediments are described as an unbedded, unsorted mixture of clay, silt, sand, and pebbles with a few cobbles and boulders. The glacial deposits can be as thick as 100 feet.

The bedrock geology of the study area consists of Sentinel Butte Formation from the Tertiary System. The Sentinel Butte Formation consists of gray-brown bentonitic claystone, siltstone, sandstone, and lignite. The sandstone is thin bedded and is generally fine-grained and silty. This formation can be up to 510 feet thick.

No economic coal deposits were identified within the study area as shown in Appendix B. These deposits meet the minimum criteria established by coal companies operating surface mines in North Dakota (Murphy 2007). One economic coal deposits was identified in several areas adjacent to the southwestern corner of the study area. This deposit has not been mined and does not represent an active mining area. HDR recommends that Infinity consult with landowners regarding the presence of economic coal deposits. Conflicts with future coal mining operations could be avoided by placing turbines and other project facilities outside of areas thought to include economic coal deposits.

No recorded areas of seismic activity or subsidence were identified in the study area. However, there are several active or previously mined areas that were identified south of the study area. One gravel pit is located within the study area. Approximately eight gravel pits were identified within 3 miles of the study area and are located primarily to the south (Figure 2).

Groundwater in the region supplies both public and private wells (Croft 1973). Shallow groundwater typically follows local topography and regional groundwater flow is likely directed north and east toward Lake Sakakawea and the Missouri River.

Soil Resources

The study area consists mostly of farmland areas classified as not prime farmland (77 percent). The remaining area is mostly farmland of statewide importance (19 percent). Figure 7 shows the prime farmland and farmland of statewide importance soil classifications. Table 5 shows the acreage of the various soil classifications in the study area.

Table 5. Prime Farmland Soils Project Study Area

Farmland Status	Acres of Study Area	Percentage of Study Area (%)
Prime Farmland	235	1.5
Unclassified	327	2.1
Farmland of Statewide Importance	2,972	19.1
Not Prime Farmland	12,019	77.3
Total	**15,555**	**100.0**

Source: NRCS SSURGO Soils Data

2.5 Hazardous Materials

The Environmental Protection Agency (EPA) Superfund National Priorities List (NPL) database was reviewed to determine the potential for major hazardous material issues within the study area. An Environmental Data Resources search was not purchased. However, NDDOT maps were consulted as they often identify known dumps in the area. No NPL sites are present within Stark and Morton counties (U.S. EPA CERCLIS 2009).

There are no hazardous waste handlers or toxic release inventory sites located within the study area or within 5 miles of the study area (National Atlas 2009).

HDR recommends that a Phase I Environmental Site Assessment (ESA) be conducted on all leased properties within the study area in order to properly locate and avoid hazardous and/or potentially hazardous sites. A current Phase I ESA is often requested by an insurance provider or financer of a project in order to identify potential or existing environmental contamination liabilities.

2.6 Surface Water and Floodplain Resources

Wetlands and Watercourses

As shown in Figure 8, there are intermittent streams and wetlands throughout the study area. Most are intermittent in nature, and in many cases, function as drainageways within tilled agricultural fields. More information on wetlands is found in Section 2.7.

Floodplains

The study area is located in an area of Stark and Morton counties that has not been mapped by the Federal Emergency Management Agency (FEMA). Flood Insurance Rate Maps (FIRM) are not available.

2.7 Biological Resources

Wetlands

Wetlands within the study area are scattered and relatively sparse as evidenced by NWI data. Table 6 provides the acres of NWI wetlands present in the study area. Seasonal wetlands are usually surrounded by tilled fields; open water wetlands are occasional, and in many cases associated with streams. Open water wetlands are often surrounded by pasture.

Wetlands in the state of North Dakota are regulated by USACE, whose jurisdiction only includes wetlands connected to a "Water of the U.S." (i.e. non-isolated). Based on a preliminary review of the project site using aerial photos and USGS maps, many of the freshwater emergent wetlands and freshwater ponds are isolated and will not be jurisdictional under USACE regulations. Impacts to wetlands that are jurisdictional will fall under Nationwide Permit 12 conditions, provided that the following conditions are met:

- None of the crossings are longer than 500 linear ft and do not run parallel to the stream channel.
- None of the impacts exceed 1/10th of an acre.

HDR recommends completing a wetland delineation to identify wetlands in the project area and their jurisdictional status. A delineation will also provide information to project developers to help avoid wetlands where possible and meet Nationwide Permit conditions if impacts occur. Previous wind projects in this part of North Dakota have been able to avoid jurisdictional wetlands completely, with turbine foundations, access roads and other facility components that require permanent impacts. Temporary impacts from buried underground cabling have often been required, but the 500 foot crossing distance allows sufficient distance to cross the types of wetlands that are present in the study area. As a result, permitting through USACE has not typically posed a challenge.

Table 6. NWI Wetlands in the Study Area

Type of Wetland	Acres of Wetland	Percentage of Study Area (%)
Freshwater Emergent Wetland	21.6	<1.0
Freshwater Pond	37.6	<1.0
Freshwater Forested/Shrub Wetland	0.8	<1.0
Other	2.0	<1.0
Total	**62.0**	**<0.4**

Vegetation

Agriculture is the predominant land use in the study area; crops are generally small grains and corn. North Dakota has listed twelve species which are considered noxious weeds (North Dakota Century Code chapter 63-01.1). Stark and Morton counties have no additional listed noxious weed species (NDDA 2009). None of these species have been inventoried in either county in the North Weed Mapper (State of North Dakota 2009).

Wildlife

The wildlife species likely present within the study area are typical for agricultural landscapes, pasture grasslands, and wetland habitat in the region. They include mammals such as badgers, beavers, ground squirrels, chipmunks, mice, voles, rats, moles, shrews, raccoons, skunks, and bats. Snakes, lizards, frogs, and toads are also found in the area.

Birds in the area include local predatory and grassland birds; however, a wide variety of birds may use the area seasonally during migration. Migrating birds use local ponds and wetlands for stopovers and local birds use the marshland and shrubland habitat for nesting.

Terrestrial wildlife is most common in farm fields, pasture, fencerows, intermittent creeks, and wetland areas. These areas provide corridors for migration and foraging as well as ample cover for small mammals, raptors, waterfowl, upland game birds, and other common wildlife in the area.

A review of the North Dakota Natural Heritage conservation database was not completed for this analysis, but is recommended to identify species of concern or ecosystems considered significant by the state of North Dakota.

Breeding Bird Surveys

There are no documented North American Breeding Bird Surveys Routes (BBS) occurring within the study area. There is one (Glen Ullin, 39,454.1 meters long) BBS documented which ends about 6 miles southeast of the study area. This survey route is shown on Figure 9. Surveys along the route are conducted annually during the peak of the nesting season, usually in May or June. The results of these surveys are used to estimate the number of birds that a very good birder would encounter in about 2.5 hours of birding along the BBS route. Observations along the Glen Ullin Route have identified 116 species of birds (Sauer and others 2008).

The 10 most frequently recorded BBS species along each route are listed in Table 7.

Table 7. Ten Most Frequently Recorded Species in BBS (Glen Ullin)

Bird Estimate*	Common Name	Scientific Name
195.13	Lark Bunting	*Chondestes melanocorys*
193.73	Western Meadowlark	*Sturnella neglecta*
134.13	Horned Lark	*Eremophila alpestris*
113.47	Brown-headed Cowbird	*Molothrus ater*
110.87	Red-winged Blackbird	*Agelaius phoeniceus*
102.73	Ring-necked Pheasant	*Phasianus colchious*
84.87	Mourning Dove	*Zenaida macroura*
65.53	Chestnut-col. Longspur	*Calcarius ornatus*
47.53	Common Grackle	*Quiscalus quiscula*
40.07	Bank Swallow	*Riparia riparia*

** The number of birds that a very good birder would encounter in about 2.5 hours of birding along the BBS route.*

The lark bunting is considered a North Dakota Species of Conservation Priority (SoCP). See Appendix C for a full list of species recorded in the Glen Ullin BBS.

Migratory birds, including many of the species documented in the BBS, are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712). The MBTA is distinct from the Endangered Species Act (ESA) (16 U.S.C. 1531-1544) because it protects migratory bird species that are not necessarily threatened or endangered. See the discussion above about potential migrating bird habitat in and near the study area.

More detailed habitat assessments and/or targeted surveys of the study area might need to be conducted prior to construction to evaluate potential impacts to bird and bat species from the proposed project. HDR recommends that Infinity contact the USFWS, NDGFD, and the North Dakota Parks and Recreation Department (which oversees the North Dakota Natural Heritage conservation database) to discuss the need for siting surveys and preconstruction plans.

Federal and State Listed Species

Section 7 of the ESA requires that all federal agencies consider and avoid, if possible, adverse impacts to federally listed threatened or endangered species or their critical habitats, which may result from their direct, regulatory, or funding actions. The USFWS is responsible for compiling and maintaining the federal list of threatened and endangered species. Section 9 of the ESA also prohibits the taking of any federally listed species by any person without prior authorization. The term "taking" is broadly defined at the federal level and explicitly extends to any habitat modifications that may significantly impair the ability of that species to feed, reproduce, or otherwise survive. While the prohibition of "taking" federal species applies to anyone, the prohibition of the destruction or adverse modification of designated critical habitat only applies to federal agencies.

The USFWS provides federally threatened and endangered species data at the county level for public use. According to the USFWS, Stark County has two endangered species and one threatened species and Morton County has four endangered species and one threatened species (Table 8, USFWS 2010).

Designated Critical Habitat for piping plover is located in Lake Audubon, Lake Sakakawea, and the Missouri River. These bodies of water are outside of the study area.

Table 8. Federally Listed Threatened and Endangered Species in Stark and Morton Counties

Common Name	Latin Name	County	Habitat	Status
Black-footed Ferret	*Mustela nigripes*	Stark, Morton	Prairie dog complexes	Endangered
Gray Wolf	*Canis lupus*	Stark, Morton	Frequently observed in Turtle Mountains	Endangered
Interior Least Tern	*Sternula antillarum*	Morton	Missouri River and Yellowstone sandbars; beaches;	Endangered
Piping Plover**	*Charadrius melodus*	Stark, Morton	Missouri River sandbars, alkali beaches	Threatened
Pallid Sturgeon	*Scaphirhynchus albus*	Morton	Bottom dwelling, Missouri and Yellowstone Rivers	Endangered

*** Designated Critical Habitat for piping plover is located on the following water bodies: Lake Audubon, Lake Sakakawea, and the Missouri River. All of these water bodies are located north and east of the study area.*

<u>Black-footed ferret</u>—Historically, black-footed ferrets occupied much of the Great Plains region of North America, colocating with prairie dog (*Cynomys* sp.) colonies and complexes. Black-footed ferrets depend on prairie dog complexes for food and habitat. Prairie dogs and black footed ferrets prefer level topography in grasslands, steppe, and shrub steppe. Plowed lands, forests, wetlands, and water are avoided (USFWS 1988). There are no records of recent black-footed ferret occurrences in North Dakota but there is potential for reintroduction (USFWS 2008b).

<u>Gray wolf</u>—The gray wolf was historically found throughout North America, with the exception of parts of the southwest and southeast United States. There have been documented occurrences of gray wolves in North Dakota during the 1990s. The presence of wolves in most of North Dakota would likely remain sporadic and consist of occasional dispersing animals from Minnesota and Manitoba (USFWS 2008a). Wolves have most frequently been observed in the Turtle Mountains of North Dakota, approximately 200 miles from the study area (USFWS 2008b).

<u>Interior least tern</u>—The interior least tern is a migratory species that breeds along the Pacific, Atlantic, and Gulf coasts as well as the major interior rivers of North America. Historically the interior population bred along the Mississippi, Missouri, Arkansas, Red, Rio Grande, and Ohio River systems (USFWS 1994). In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone Rivers upstream of Lake Sakakawea. Approximately 100 pairs breed in North Dakota (USFWS 2008c).

<u>Piping plover</u>—The piping plover breeding range stretches from south central Canada into the Midwest United States. The majority of piping plover breeding pairs found in the United States are concentrated in Montana, the Dakotas, and Nebraska. This population of piping plover winters in the Gulf of Mexico. In

North Dakota, the piping plover nests on midstream sandbars along the Missouri and Yellowstone Rivers and along shorelines of saline wetlands. More piping plovers nest in North Dakota than any other state (USFWS 2008b). There is no USFWS-designated critical habitat for the piping plover in the study area (50 CFR Part 17). The closest critical habitat is located along Lake Sakakawea approximately 45 miles north of the study area.

USFWS has been taking a very cautious approach to energy projects within the migratory corridor and they should be consulted to discuss potential impacts and probable avoidance or mitigation strategies.

<u>Pallid Sturgeon</u>—The pallid sturgeon's native habitat in the Mississippi and Missouri Rivers and their tributaries includes large river ecosystems with high turbidity, free flow, and warm water, according to the Pallid Sturgeon Recovery Plan (USFWS 1993). There is no habitat in the study area.

<u>Whooping Crane</u>—Historic nesting ranges for the whooping crane are thought to have extended throughout the northern Great Plains (USFWS 2007a). The Aransas-Wood Buffalo population of whooping cranes winters in the Aransas National Wildlife Refuge on the Texas Gulf Coast, and then migrates across the Great Plains to breed in the summer in the Wood Buffalo National Park in Northwest Territories, Canada. This population contained 236 individuals in October 2007 (Stehn and Wassenich 2008), and is the only self-sustaining, wild population (USFWS 2007b). The study area is within the 200-mile wide migratory corridor (Figure 9). The migration corridor was identified based on sightings since 1975 (USFWS 2007).

No sightings have been documented in the study area, and the nearest confirmed sighting is 14 miles east-northeast of the project area. Wetland maps and aerial photos indicate that there are very few areas within the study area that would provide habitat for whooping cranes during migration. The lack of viable habitat increases the likelihood that the USFWS and NDGFD will view wind development within the study area positively.

USFWS has been taking a very cautious approach to energy projects within the migratory corridor and they should be consulted regarding potential impacts and probable avoidance or mitigation strategies. Based on guidance provided in an April 2009 issues paper (USFWS 2009), the USFWS is recommending the following for wind projects located within the whooping crane migratory corridor (such as the Sunflower Wind Project):

- Provide compensatory mitigation for every acre of habitat lost to the construction of wind turbines.
- Mitigate or provide conservation offsets for every acre of suitable wetland habitat within 0.5 mile of turbines.
- Maximize placement of collector or transmission lines underground
- Mark project aboveground collector or transmission lines with bird flight diverters.
- Mark existing aboveground transmission lines with bird flight diverters (equal length to the new aboveground lines associated with the project).

Currently, a group of wind energy developers (coordinated by American Wind Energy Association) is in the process of developing a region-wide Habitat Conservation Plan (HCP) for the whooping crane. At this time it is unclear what recommendations for wind turbine siting will be included in the HCP or how the HCP will apply to wind developers who were not part of the HCP process. However, it is likely that the release of the draft HCP (currently scheduled for late 2010) will change USFWS's approach to wind energy development in the whooping crane migratory corridor. At this time, we anticipate that the recommendations included above will still likely be included to some degree in the region-wide HCP.

Species of Conservation Priority —NDGFD has identified 100 SoCP across the state in its Wildlife Action Plan (Hagen et al. 2005). These species are considered important for conservation in the State of North Dakota but do not have any legal protection. The NDGFD has further refined its 100 SoCP into three categories, Levels I-III, with Level I species being of the greatest concern. Thirty-four SoCP species have been identified in the Missouri Slope geographic region, including thirteen Level I species, twelve Level II species, and nine Level III species. Table 9 shows Level I species that have been documented in Stark and Morton counties.

Table 9. Species of Conservation Priority in the Missouri Slope Region

Common Name	Scientific Name	Habitat Type	Habitat Details
Swainson's Hawk	*Buteo swainsoni*	Native Prairie/ Grassland/Forests	Require native prairie or cropland that includes thickets of natural tree growth, brush margins of native forested tracts, or shelterbelts and tree claims.
Ferruginous Hawk	*Buteo regalis*	Native Prairie	Confined to very limited areas of native prairie, usually those with hilly terrain or with low-grade topsoil that has not been altered by the plow or lower quality from overgrazing.
Upland Sandpiper	*Bartramia longicauda*	Native Prairie/ Grassland	Inhabit mixed-grass prairie, local extensive tracts of wet meadow, grazed tall-grass prairie, tame haylands, CRP fields, and mowed or burned railroad or highway rights-of-way.
Long-billed Curlew	*Numerius americanus*	Native Prairie/ Grassland	Dry, native grasslands.
Wilson's Phalarope	*Phalaropus tricolor*	Wetland	Found in swales along ephemeral streams and various types of ponds and lakes that contain expanses of shallow water that are interspersed with, or adjacent to, wet-meadow vegetation.
Sprague's Pipit	*Anthus spragueii*	Native Prairie	Native medium to intermediate height prairie. In short grass prairie landscape, can often be found in areas with taller grasses. More abundant in native prairie than in exotic vegetation. Requires relatively large areas of appropriate habitat.
Grasshopper Sparrow	*Ammodramus savannarum*	Native Prairie	Open prairies with intermittent brush, avoids heavy brush cover.
Baird's Sparrow	*Ammodramus bairdii*	Native Prairie /Grassland	Native prairie; structure may be more important then plant species composition. Nesting may take place in tame grasses (found in Crested Wheat, while avoids Smooth Brome). Areas with little to no grazing activity are required.
Lark Bunting	*Calamospiza melanocorys*	Native Prairie/ Grassland	Short-grass & mixed-grass communities as well as fallow fields, roadsides, and hayfields.
Chestnut-collared Longspur	*Calcarius ornatus*	Native Prairie/ Grassland	Located in tracts of heavily grazed or hayed mixed-grass prairie or mixed-grass/short-grass prairie.

Common Name	Scientific Name	Habitat Type	Habitat Details
Plains Spadefoot	*Spea bombifrons*	Native Prairie/ Grassland/Cropland	Found in the dry prairies, sagebrush communities, and farm fields.
Western Hognose Snake	*Heterodon nasicus*	Native Prairie	Prefers sandy or gravelly habitats like sand prairies, very open portions of prairies, or sand dunes with very little cover.
Black-tailed Prairie Dog	*Cynomys ludovicianus*	Native Prairie/ Grassland	Require short-grass prairie habitats. They avoid heavy brush and tall grass areas due to the reduced visibility these habitats impose.

Source: North Dakota Action Plan

Recommendations

Per USFWS Wind Turbine Guidelines Advisory Committee's recommendations[2], this report provides the preliminary information necessary for a Tier II wildlife analysis. However, to complete a Tier II analysis per the recommendations, a qualified biologist should conduct a site visit to examine the site for wildlife resources and field-check desktop wetland and landcover data. This information will be useful in understanding whether further quantitative and scientifically rigorous studies should be conducted to further assess the potential risk of the proposed project to wildlife (a Tier III analysis). Additionally, the USFWS in North Dakota has historically looked favorably on wind developers that have developed Avian and Bat Protection Plans.

2.8 State & Local Permitting

The state of North Dakota currently requires a Certificate of Site Compatibility (N.D.C.C. Ch. 49-22) for any wind energy facility larger than 60 MW which is issued by the North Dakota Public Service Commission (NDPSC). Projects smaller than 60 MW are covered under county regulations, if they exist. Many counties in North Dakota have recently adopted, or are considering, ordinances specific to wind energy facility siting. Morton County has adopted a wind energy facility provision. Stark County is considering an ordinance governing wind energy facilities, but has not yet taken action to adopt one. NDPSC has typically asked wind developers to honor county ordinances when completing the site compatibility application process. Most counties also require conditional or special use permits to build wind energy facilities within county boundaries, but these permit applications often include information already generated for the state site compatibility application. Timelines for permit applications vary, but are typically 6-9 months for the NDPSC site compatibility process and 3-6 months for the county conditional/special use permit process.

Both the NDPSC and Morton County have setback requirements for wind turbines. A list of setbacks is shown in Table 10.

[2] http://www.fws.gov/habitatconservation/windpower/Wind_Turbine_Guidelines_Advisory_Committee_Recommendations_Secretary.pdf

Table 10. State and Local Setback Requirements for Wind Turbines

Setback Feature	NDPSC Voluntary Requirement	Morton County Requirement
Structures	1,500 feet from occupied residence	1,320 or 1.25 times height (whichever is greater) from occupied dwelling, commercial or publicly used structure or building, state or county park.
Public Roads Overhead Transmission	Turbine height (i.e. fall-down distance)	250 feet
Project boundary		1.5 rotor diameter (RD) (Can be modified with variance from affected property owner.
Non-leased Property	1.5 RD	

HT= Total turbine height, measure form highest point of blade.
RD= Rotor Diameter

2.9 CONCLUSIONS

Through due diligence and proactive project development, the potential critical issues associated with this study area may be minimized or avoided. According to HDR's review, the critical issues associated with this study area include:

- Location of the study area within the federally-listed whooping crane migratory corridor will require consultation with the USFWS but the lack of confirmed sightings near the study area and the minimal wetland habitat in the study area make significant concerns less likely.
- Potential interference with microwave beam paths in study area. HDR recommends a microwave beam path study to identify corridors within the study area that may not be viable for wind turbine installation.
- Potential impacts on undiscovered cultural resources

To minimize or avoid these critical issues and other impacts that may arise, HDR suggests continued coordination and consultation with the USFWS regarding potential wetland and grassland easements, and with NDGFD and North Dakota Parks and Recreation Department regarding impacts to the sensitive species listed in Table 8 and Table 9, as well as other species of birds and bats potentially occurring in the area. HDR additionally recommends that Infinity consider preparing and implementing an Avian and Bat Protection Plan for use during construction and operation of the project.

The initial agency response from the USFWS did not include any site specific information. The initial agency response from the NDGF included requests for wetland avoidance and routine monitoring for avian and bat mortality, but did not mention any site specific issues for the Sunflower study area. Complete response letters are included in Appendix D.

HDR recommends that Infinity consider the Wind Turbine Guidelines Advisory Committee recommendations to the USFWS (March 4, 2010) to protect wildlife resources while siting and developing a wind project at this site. This would include consulting with the USFWS and the NDGFD and completing a more detailed Tier II site characterization study. If appropriate, more detailed habitat assessments and/or targeted surveys (Tier III field studies) might also be conducted prior to construction to better predict wildlife impacts and identify potential mitigation options. If combined with post construction monitoring, these studies and surveys will improve the industry's understanding of how select species may be impacted by wind energy development. For this project in particular, potential field studies requested by agencies appear in Table 11.

Table 11– Potential Field Studies and Anticipated Timelines

Field Study	Duration	Lead Time before PSC Application
Bat Surveys	9-12 months (spring-fall)	12-15 months
Avian Point County Surveys	9-12 months (spring and fall)	12-15 months
Endangered and Threatened Species Habitat Assessments (Tier II Field Studies)	1 month	2-3 months prior to avian/bat surveys
Wetland Delineations	1 month (during growing season)	6 months
Phase I Environmental Site Assessment	1 month	3 months
Cultural Resource Literature Review	1 month	3 months prior to Cultural Resource Field Surveys
Cultural Resource Field Surveys	2-3 months	6 months

Off-site noise modeling for wind projects has typically been included as part of the NDPSC site compatibility process and HDR recommends that a noise study be completed once a turbine layout has been finalized and a NDPSC site compatibility application is being prepared. The 1,500-foot voluntary setback requirement has typically been sufficient to reduce noise levels from wind turbines at the nearest sensitive noise receptors to below recommended levels. The low population of the study area reduces the likelihood that the wind turbine noise will impact area residences and that setback requirements from homes will significantly impact the site layout.

Visual simulations are becoming more common for projects completing the NDPSC site compatibility application, but are not required. HDR recommends a review of the project area to identify any key areas within the project viewshed that may generate visual impact concerns (e.g. public recreation areas, sensitive landowners, etc.). If key areas are encountered, visual simulations of the wind turbine layout from the locations are recommended.

HDR also recommends meeting with Stark and Morton counties and PSC to discuss the project and their permitting expectations prior to submittal of permit applications Although HDR was unable to confirm the public perception toward wind projects in Stark and Morton counties, obtaining local community support is critical for developers. We recommend that Infinity develop a public involvement plan to maximize public support.

3.0 PERMITS AND APPROVALS

This table provides a summary of the environmental permits that may be required by federal, state, and local permitting agencies, based on HDR's permitting experience with similar projects. Not all of these permits may be required. Conversely, other permits not listed below may be necessary depending on the issues identified as the project is developed.

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
Federal Approvals							
FAA	49 USC 44718	Notice of Proposed Construction (Form 7461-1) Hazard Determination Notice of Actual Construction or Alteration (Form 7461-2)	Notifies FAA of proposed structures that might affect navigable airspace. Form requires proposed markings and lighting. FAA must review possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.	All turbines/structures more than 200 feet tall; and/or turbines/structures less than 200 feet tall near an airport.	No fee.	One week to prepare application; submit notice at least 30 days prior to anticipated start of construction and after construction has been completed.	http://www.faa.gov/
USACE	Clean Water Act	Section 404 Permit	Required for the discharge of dredged or fill material into waters of U.S. Minimal levels of file may be covered under existing General Permits/Letters of Permission	Presence of waters of the U.S. that will be impacted by project	No fee.	Depends on level of fill and type of permit required (individual vs. nationwide)	http://www.usace.army.mil/

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
US Fish and Wildlife – Region Six	Section 7/9 /10 of Endangered Species Act (ESA)	Consultation pursuant to Section 7 or 10 of the Endangered Species Act - USFWS and project proponent (or federal agency) to coordinate on how to implement proposed project while avoiding impacts to federally-listed endangered species to the greatest extent feasible.	Determination that "take" is likely to occur during a proposed non-Federal activity and a decision by the landowner or project proponent to apply for an incidental take permit. Federal activities and non-Federal activities that receive Federal funding or require a Federal permit (other than a section 10 permit) typically obtain incidental take authority through the consultation process under section 7 of the ESA. Thus, the Habitat Conservation Plan (HCP) process is designed to address non-Federal land or water use or development activities that do not involve a Federal action that is subject to section 7 consultation.	Presence of endangered species near the study area and project potentially impacting the endangered species. If a federal permit or approval is required, Section 7 Consultation will be necessary.	No Fee	Prior to ground disturbing activities. Depending on project size and potential impacts to listed species – 1 to 6 months.	http://www.fws.gov/endangered/hcp/hcpbook.htm http://www.fws.gov/mountain-prairie/endspp/
	Compatibility Analysis for wetland/ grassland easements	USFWS and project proponent and consult on project compatibility and special use permit for special easements.	If turbines are placed in wetland or grassland easements then a compatibility determination by the wetland management district is required.	Placement of turbines in a wetland or grassland easement	No fee	Prior to ground disturbing activities. Depending on the number of easements the time for review could be longer – 1 to 3 months.	

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
U.S. Environmental Protection Agency	40 CFR 112	Spill Prevention and Counter-measure Control Plan	Would be required if any facility associated with the project (O&M or substation) has a tank holding more than 1,320 gallons.	Oil storage of more than 1,320 gallons of oil		A copy of the plan will need to be maintained on file with the owner/operator and reviewed by the certifying engineer every five years.	
State Approvals							
North Dakota Public Service Commission	Pursuant to North Dakota Century Code 49-22	Certificate of Site Compatibility	For facilities with greater than 60 MW nameplate capacity. PSC voluntary setback requirements are listed in Table 10.	Generation of power described in previous column.	Variable based on project size.	180 days prior to construction (minimum).	http://www.psc.state.nd.us/jurisdiction/electricity-laws.html
	Pursuant to North Dakota Century Code 49-22	Certificate of Corridor Compatibility and Route Permit	High voltage transmission line approval. Application for both approvals can be prepared/reviewed concurrently. Requires adherence to exclusionary criteria, avoidance criteria, selection criteria and policy criteria	Transmission line greater than 115 kV.	Variable based on project size.	180 days prior to construction days prior to construction (minimum).	http://www.psc.state.nd.us/jurisdiction/electricity-laws.html
North Dakota Department of Health	Clean Water Act	Section 401 Certification	Verify that project construction would comply with state water quality standards.	A 401 Water Quality Certification required if a Section 404 permit is required	No fee.	Same as a Section 404 Permit.	http://www.ndhealth.gov/WQ/
	National Pollutant Discharge Elimination System Act	General Permit (Construction)	For stormwater discharges from construction activities	Grading of more than 1 acre.	No fee for small construction activities	Permit to be filed prior to construction with a Stormwater Pollution Prevention Plan (SWPPP).	http://www.ndhealth.gov/WQ/Storm/Construction/ConstructionHome.htm

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
		Septic Tank and Drainfield Permit	Required for installation of septic system at O&M facility	Installation of a septic system		Prior to construction	
North Dakota Division of Emergency Services		Emergency Planning and Community Right-to-Know Act (EPCRA) Tier II report	Use of hazardous chemicals/materials.	Generate 220 pounds or more per month hazardous waste	$413	Submit annually.	http://www.nd.gov/des/uploads/resources/330/tieriireportinginfopacket.pdf
North Dakota Department of Transportation		Road Approach/ Access Permit	Required to provide driveway access to state owned right of way.	Project requires change in access to or from state right of way or change in use of property.		Prior to construction	
	North Dakota Century Code 24-01	Utility Permit/Risk Management Documents	Required to install utilities within state owned right-of-way	Project requires a utility line crossing of DOT right-of-way	Between $100-$200 per crossing	Prior to construction	http://www.dot.nd.gov/divisions/design/utilitypermits.htm
North Dakota Highway Patrol		Overheight/Overweight Permit	Required to transport oversize loads on state maintained roads.	Project construction requires oversize/ overweight truck loads.	Depends on load being carried between $20 and $100	Prior to construction	http://www.nd.gov/ndhp/permits/permits.html
State Historic Preservation Office (SHPO) and the Office of the State Archaeologist (OSA)	Pursuant to North Dakota Century Code 55-10; 49-22 and Section 106 Compliance	Review and Coordination	Field reviews for archaeological resources will likely be required by the North Dakota PSC as a condition of the Certificate of Site Compatibly. Section 106 Compliance is required if there is a federal permit or approval	Certificate of Site Compatibility Review by the ND PSC or federal permit/approval.	No Fee	Prior to construction	

Regulatory Authority	Statute	Permit/ Approval	Description	Trigger	Fee	Application Timeline	Website
North Dakota Department of Game and Fish		Wildlife conservation recommendations	Consultation will be required as part of by North Dakota PSC review of the Certificate of Site Compatibility	Certificate of Site Compatibility Review by ND PSC	No Fee		
North Dakota State Water Commission		Temporary Water Permit	Required for temporary use of surface or groundwater	Construction water used onsite		Prior to construction; permit is valid for up to one year	http://www.swc.state.nd.us/4dlink9/4dcgi/GetSubCategoryRecord/Permits/Water%20Permits
Local Regulations							
Stark and Morton County	County Regulations (Morton and Stark)	Conditional Use Permit	All proposed wind energy facilities in an agricultural zone must apply for a conditional use permit with County Planning Commission	Wind energy facility in agricultural zone	Contact County	Prior to construction. Process takes about 3 months.	
	County Regulations- Morton Only	Wind Energy Facilities	Construction requirements (materials used, proximity to buildings, etc). Setbacks are listed in Table 10.	Wind development	N/A	Prior to construction	http://www.co.morton.nd.us/vertical/Sites/%7B90CBB59C-38EA-4D41-861A-81C9D EBD6022%7D/uploads/%7B5A74CC6D-8D37-4C41-B6 76-1AE4A6040CDB%7D. PDF
	County Regulations (Morton and Stark)	Road Crossing/ Encroachment Permit	Required for installation of service connections or extensions of existing underground utilities including crossing of county highways or for placing temporary obstructions on the Right-of-Way.	Working in or utility crossing of county road right-of-way	Contact County	Prior to construction	
	County Regulations (Morton and Stark)	Building Permit	Required if O&M building is constructed	O&M Building	Contact County	Prior to construction	

4.0 REFERENCES

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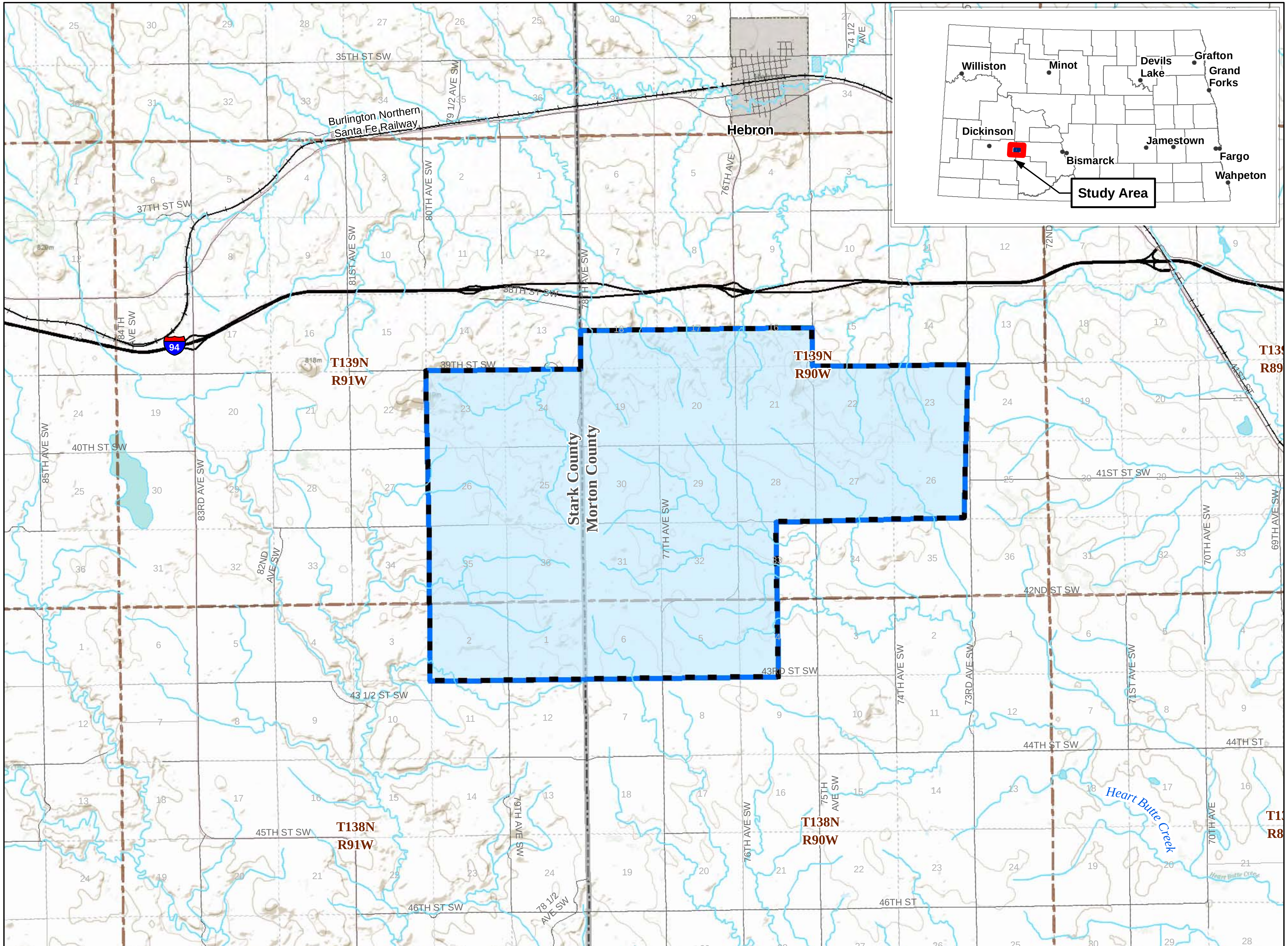

Sunflower Wind Project

Figure 1 Study Area Location

Morton and Stark Counties, North Dakota

- Study Area Boundary
- Local Road
- Unimproved Road
- Highway
- Railroad
- Section Boundary
- Township Boundary
- Municipal Boundary
- County Boundary
- Stream/River

N

0 1 2 Miles

0 2,000 4,000 Meters

0 4,000 8,000 Feet

INFINITY WIND POWER

HDR

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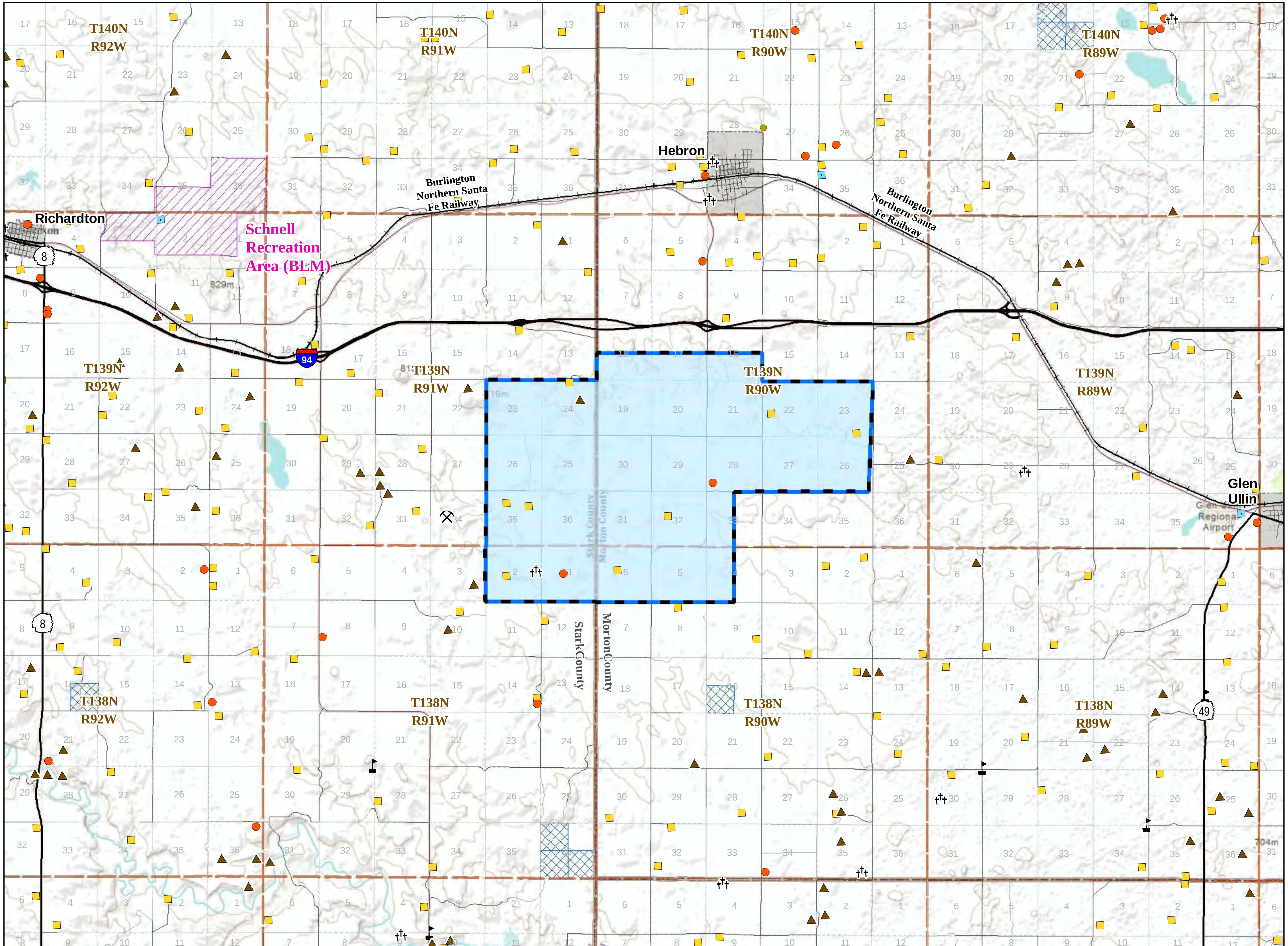


Sunflower Wind Project

Figure 2
Public Land & Resource Map

Morton and Stark Counties, North Dakota

- Study Area Boundary
- Dwelling other than farm
- Farm Unit
- Recreation
- Dump or Landfill
- Cemetery
- Gravel Pit
- Mine Shaft or Drift
- School
- US Bureau of Land Management
- State Trust Land
- Highway
- Railroad
- Local Road
- Unimproved Road
- Section Boundary
- Township Boundary
- County Boundary
- Municipal Boundary

N

0 0.5 1 2 3
Miles

0 1,000 2,000 4,000
Meters

0 3,750 7,500 15,000
Feet

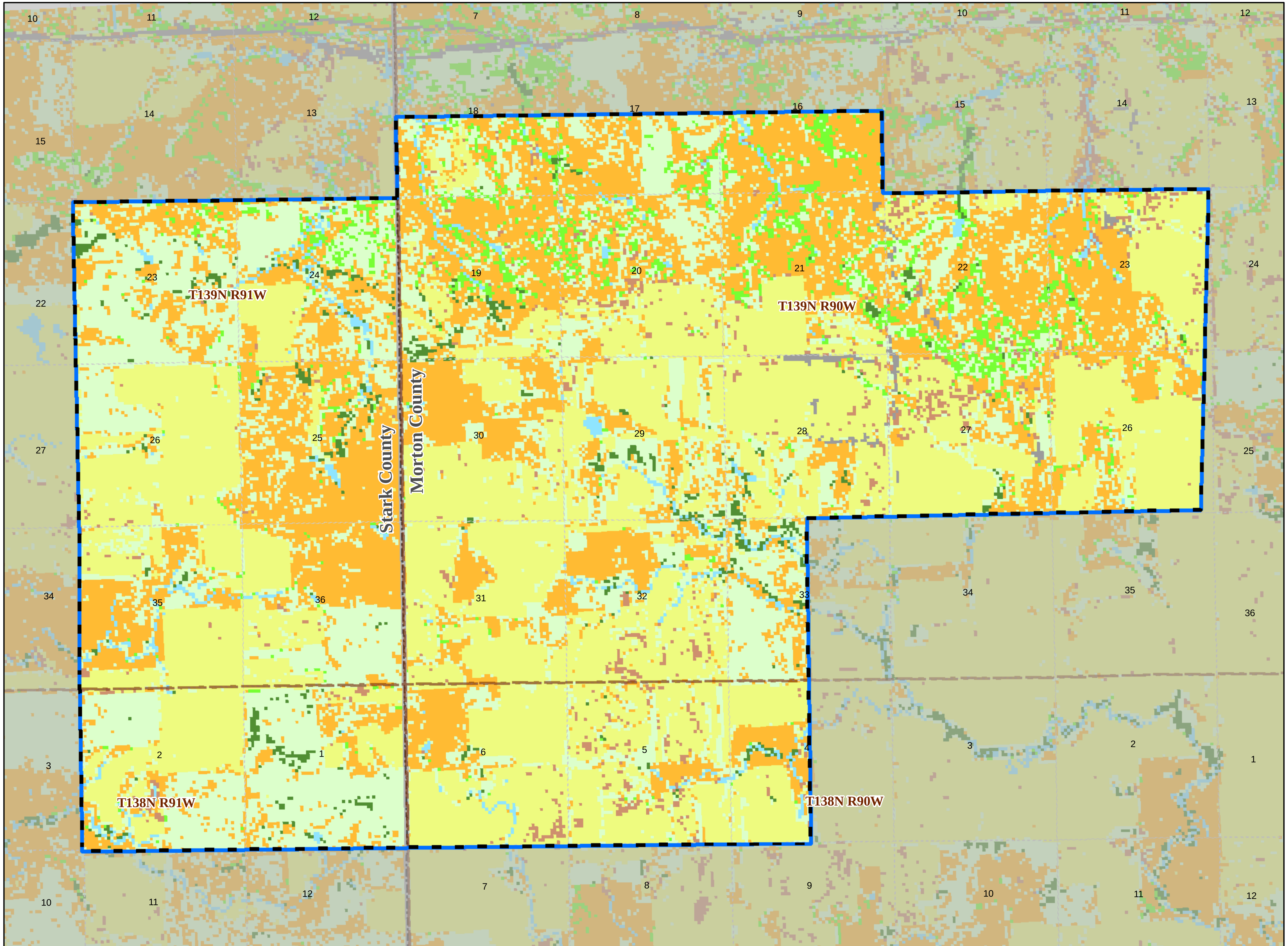
INFINITY WIND POWER

HDR

Sunflower Wind Project

Figure 3
Land Cover

Morton and Stark Counties, North Dakota



- Study Area Boundary
- Local Road
- Major Highway
- Railroad
- Section Boundary
- Township Boundary
- County Boundary

Land Cover Type

- Cropland
- Developed
- Planted Herbaceous Perennials
- Prairie
- Shrubland
- Wetland
- Woodland
- Barren Land

N

0 0.5 1
Miles

0 500 1,000
Meters

0 2,500 5,000
Feet

INFINITY WIND POWER

HDR

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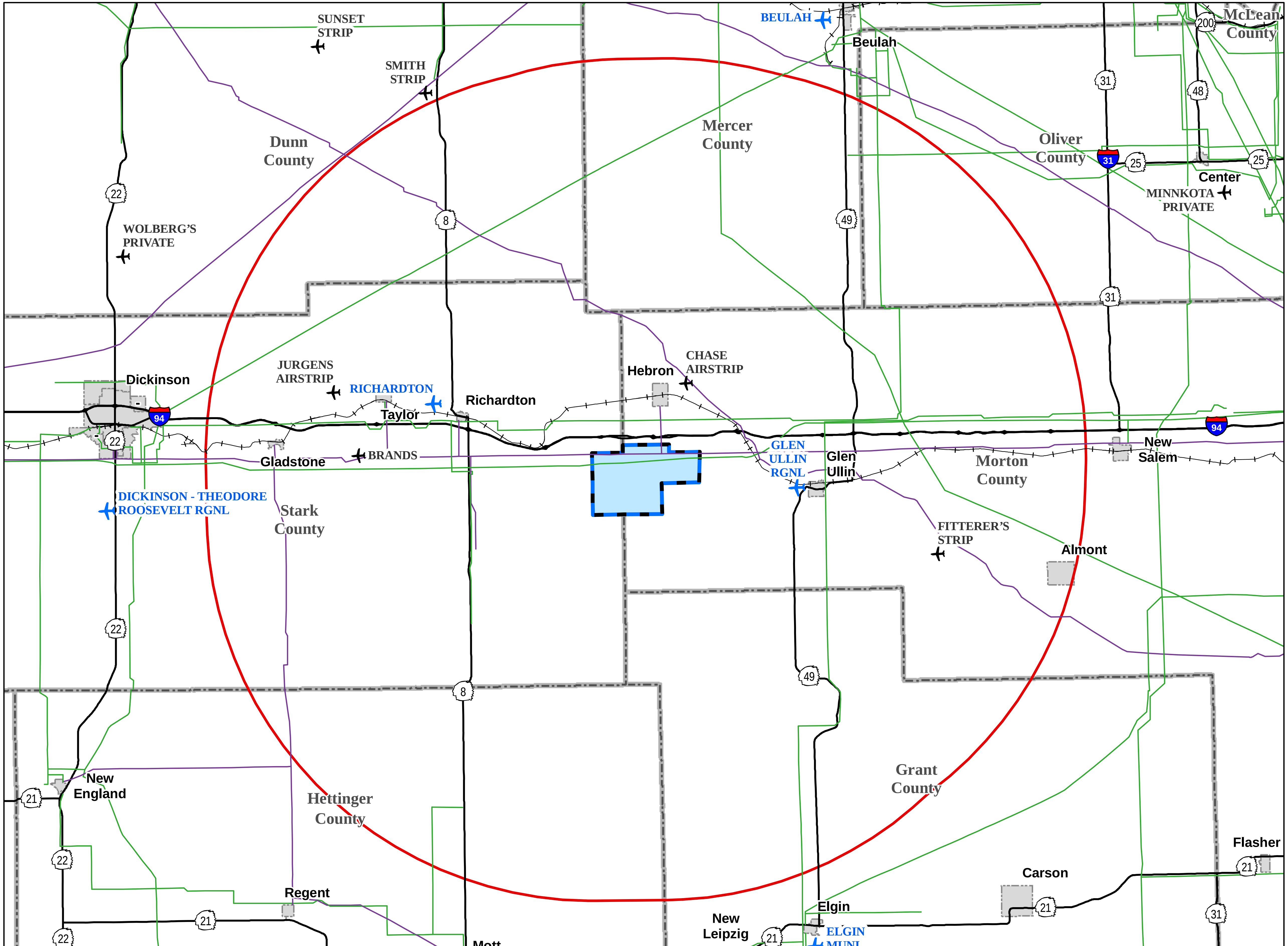

Sunflower Wind Project

Figure 4
Airport and Utilities Map

Morton and Stark Counties, North Dakota

- Study Area Boundary
- 25-mile Radius
- Public Airport
- Private Airport
- Electric Utility
- Gas Utility
- Highway
- Railroad
- Municipal Boundary
- County Boundary

0 5 10
Miles

0 5,000 10,000
Meters

0 20,000 40,000
Feet

INFINITY WIND POWER

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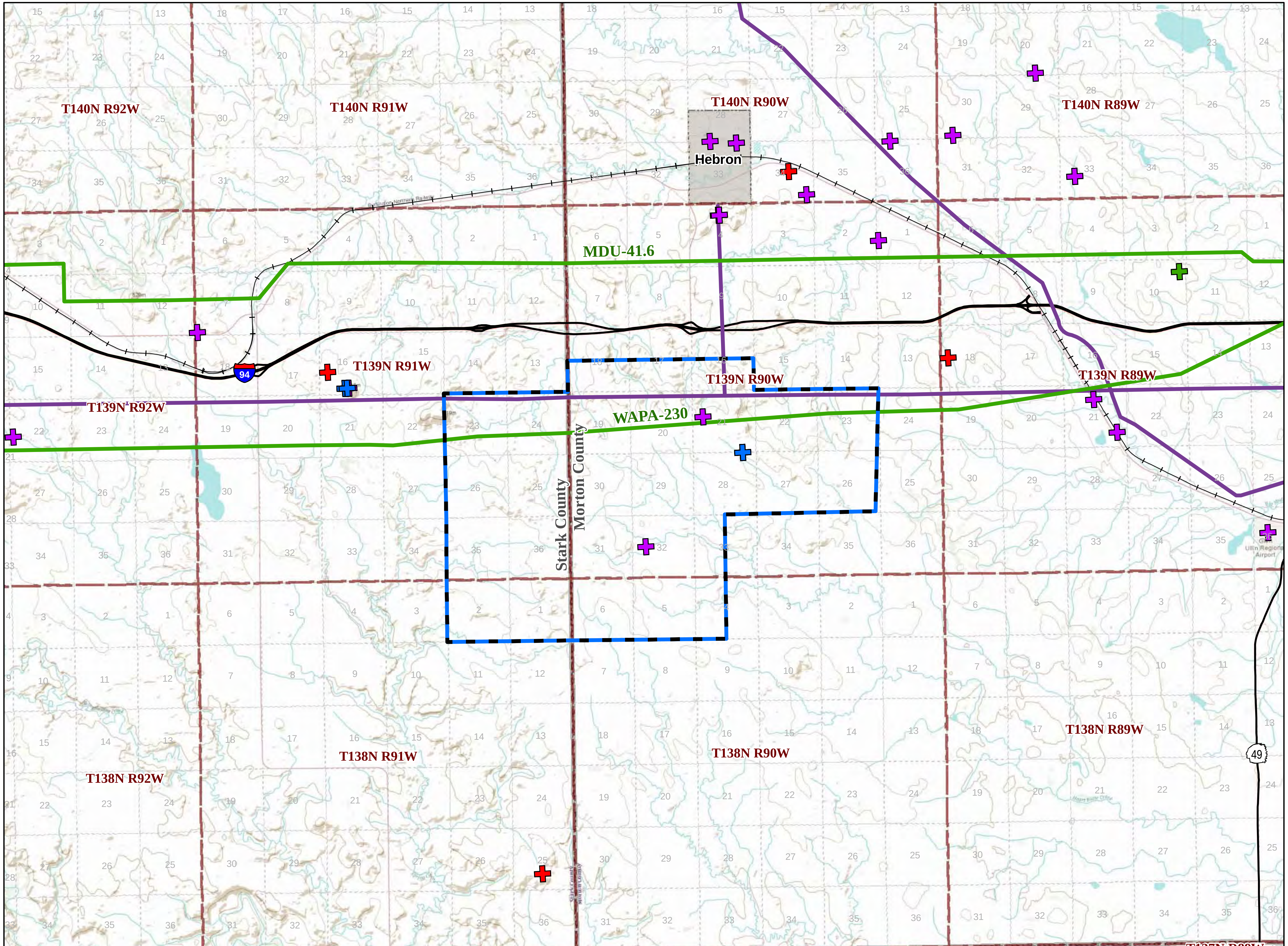
Sunflower Wind Project

Figure 5
FCC and Utilities Map

Morton and Stark Counties, North Dakota



Microwave Tower
Land Mobile Tower (Private)
Land Mobile Tower (Commercial)
Cellular Tower
ASR Tower
Study Area Boundary
Electric Transmission Lines
Gas Pipeline
Highway
Railroad
Municipal Boundary
County Boundary

N

0 1 2
Miles

0 2,000 4,000
Meters

0 5,000 10,000
Feet

INFINITY WIND POWER

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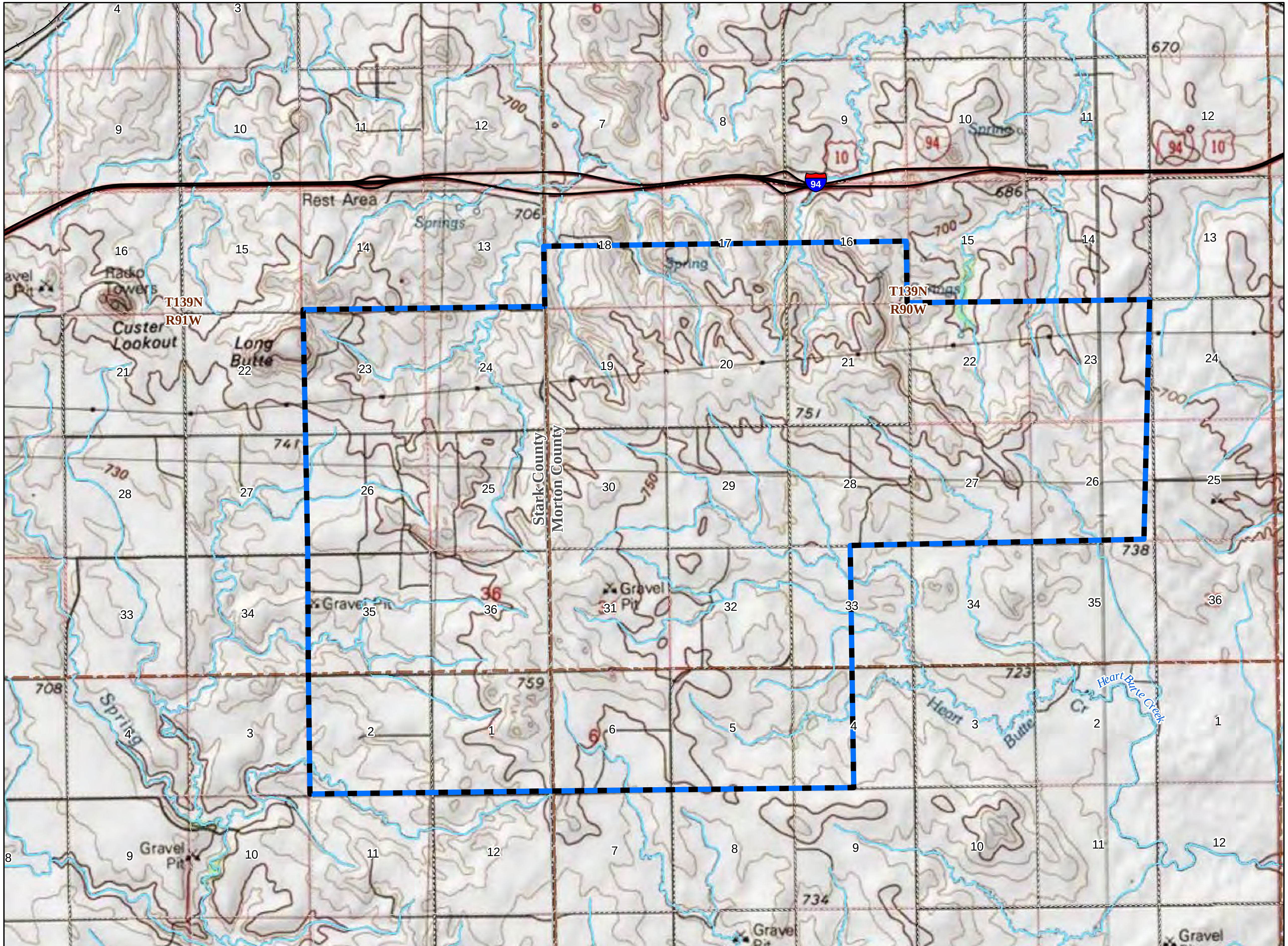

Sunflower Wind Project

Figure 6
Topography

Morton and Stark Counties,
North Dakota

Study Area Boundary
Highway
Railroad
Section Boundary
Township Boundary
Municipal Boundary
County Boundary
Stream/River

N

0 0.5 1
Miles

0 1,000 2,000
Meters

0 2,000 4,000
Feet

INFINITY WIND POWER

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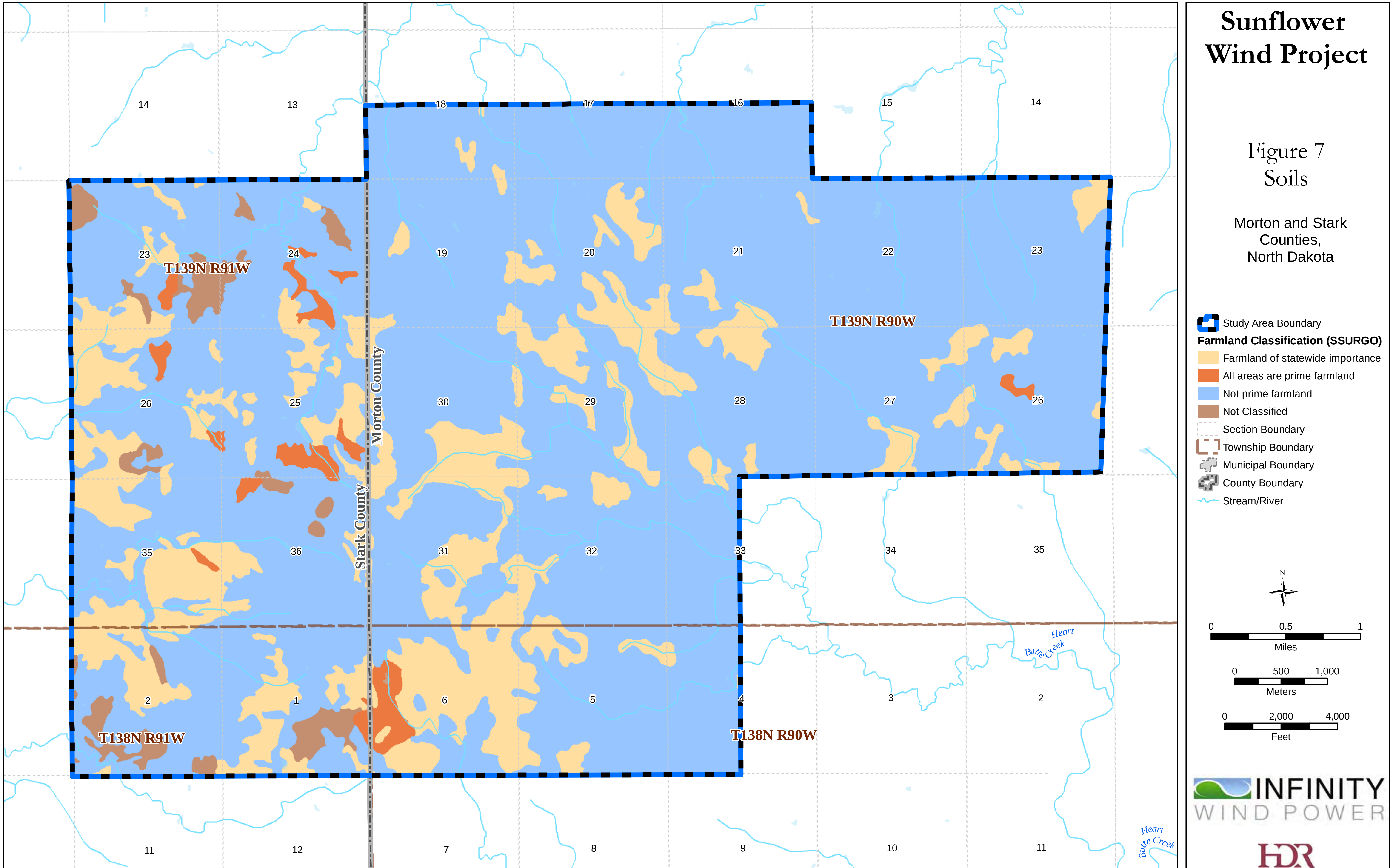
Sunflower Wind Project

Figure 7
Soils

Morton and Stark Counties, North Dakota



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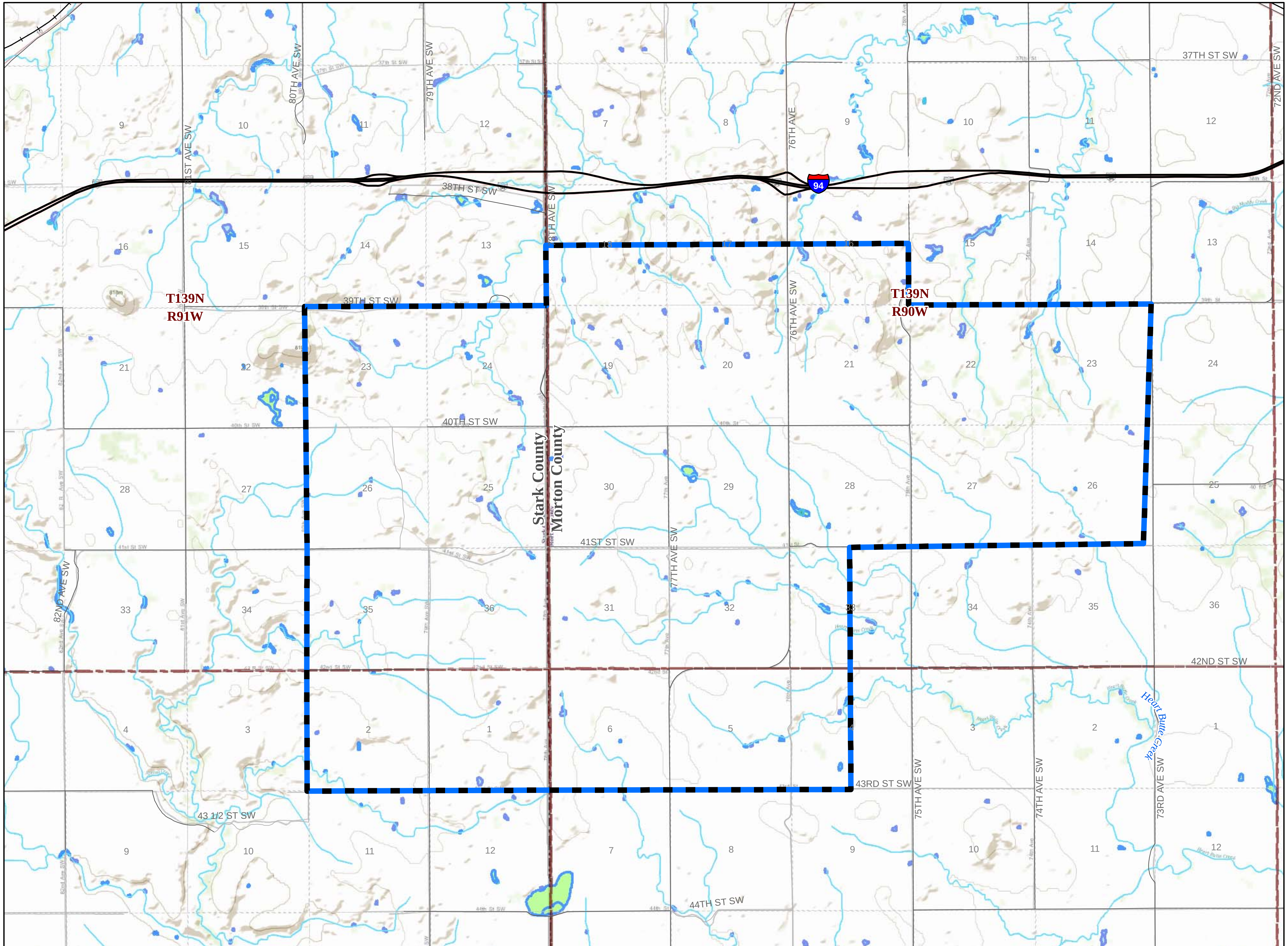

Sunflower Wind Project

Figure 8
Surface Water & Wetlands Map

Morton and Stark Counties, North Dakota

Study Area Boundary

NWI Wetlands

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Lake, Pond or River
Other

Local Road
Unimproved Road
Highway
Railroad
Section Boundary
Township Boundary
Municipal Boundary
County Boundary
Stream/River

N

0 0.5 1
Miles

0 1,000 2,000
Meters

0 2,000 4,000
Feet

INFINITY WIND POWER

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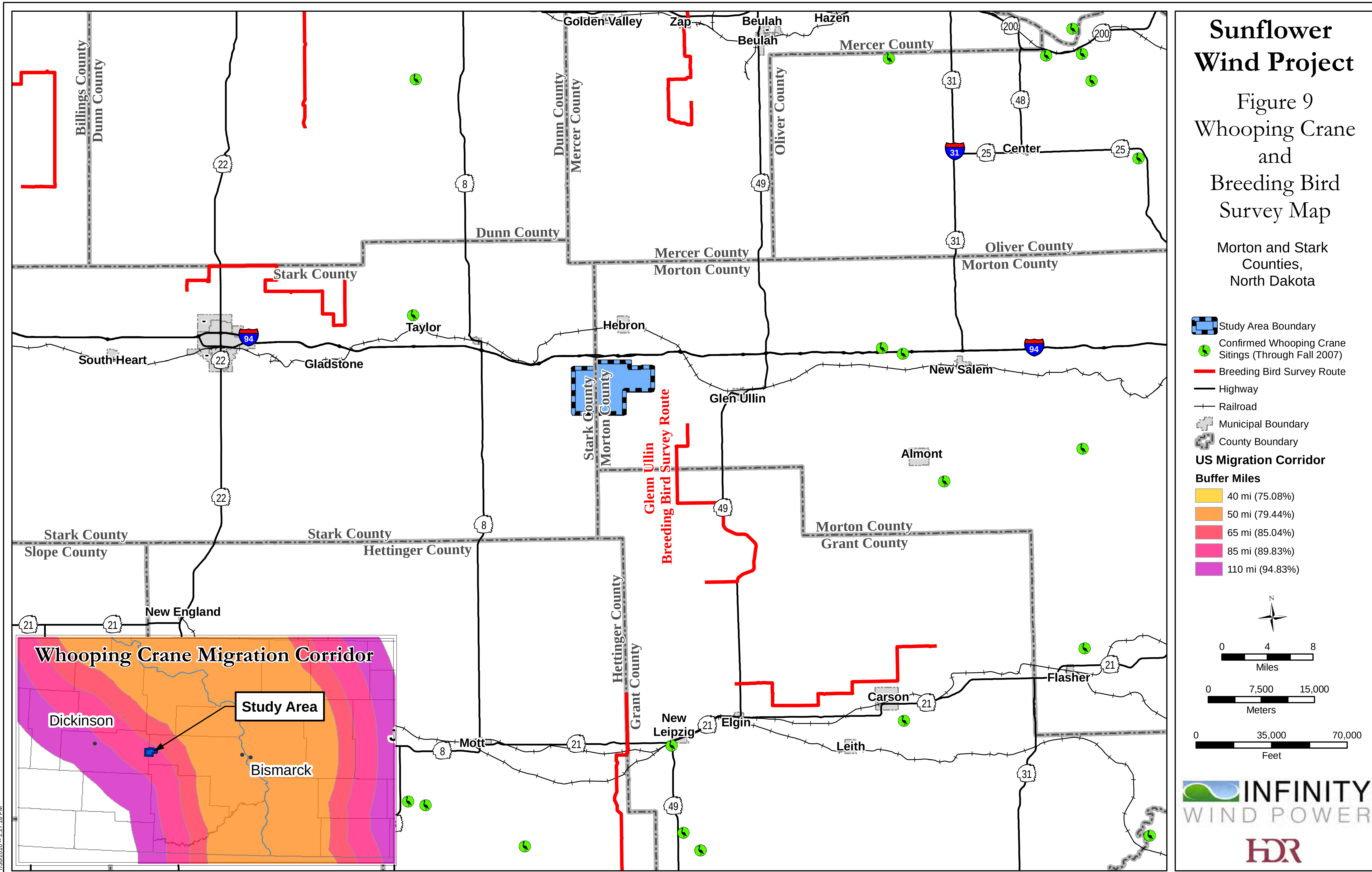

Sunflower Wind Project
Figure 9
Whooping Crane and Breeding Bird Survey Map
Morton and Stark Counties, North Dakota
Study Area Boundary
Confirmed Whooping Crane Sitings (Through Fall 2007)
Breeding Bird Survey Route
Highway
Railroad
Municipal Boundary
County Boundary
US Migration Corridor
Buffer Miles
40 mi (75.08%)
50 mi (79.44%)
65 mi (85.04%)
85 mi (89.83%)
110 mi (94.83%)
N
0 4 8
Miles
0 7,500 15,000
Meters
0 35,000 70,000
Feet
INFINITY WIND POWER
HDR
Whooping Crane Migration Corridor
Study Area
Dickinson
Bismarck
Glenn Ullin Breeding Bird Survey Route
Billings County
Dunn County
Mercer County
Oliver County
Stark County
Morton County
Slope County
Hettinger County
Grant County
Golden Valley
Zap
Beulah
Hazen
Center
Taylor
Hebron
South Heart
Gladstone
Glen Ullin
New Salem
Almont
New England
Mott
New Leipzig
Elgin
Carson
Flasher
Leith

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Appendix A –
Department of Defense Preliminary Screening Tool Results

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Federal Aviation Administration

« OE/AAA

DoD Preliminary Screening Tool

Disclaimer:

- The DoD Preliminary Screening Tool enables developers to obtain a preliminary review of potential impacts to Long-Range and Weather Radar(s), Military Training Route(s) and Special Airspace(s) prior to official OE/AAA filing. This tool will produce a map relating the structure to any of the DoD/DHS and NOAA resources listed above. The use of this tool is **100 % optional** and will provide a first level of feedback and single points of contact within the DoD/DHS and NOAA to discuss impacts/mitigation efforts on the military training mission and NEXRAD Weather Radars. **The use of this tool does not in any way replace the official FAA processes/procedures.**

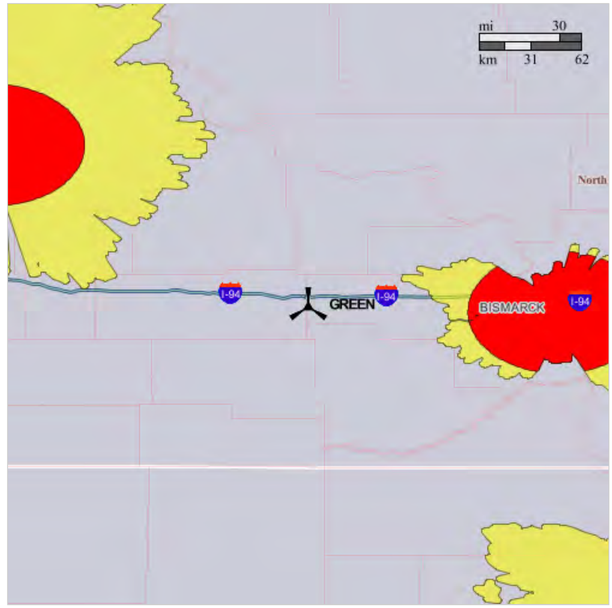
Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
  -Air Defense and Homeland Security radars(Long Range Radar)
  -Weather Surveillance Radar-1988 Doppler radars(NEXRAD)
  -Military Operations
- Enter either a single point or a polygon and click submit to generate a long range radar analysis map.
- Military Operations is only available for a single point.
- At least three points are required for a polygon, with an optional fourth point.
- The largest polygon allowed has a maximum perimeter of 100 miles.

Screening Type: Long Range Radar **Geometry Type:** Single Point

Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	49	24.54	N	102	5	6.31	W

Horizontal Datum: NAD83



Map Legend:

- **Green:** No anticipated impact to Air Defense and Homeland Security radars. Aeronautical study required.
- **Yellow:** Impact likely to Air Defense and Homeland Security radars. Aeronautical study required.
- **Red:** Impact highly likely to Air Defense and Homeland Security radars. Aeronautical study required.

Federal Aviation Administration

« OE/AAA

DoD Preliminary Screening Tool

Disclaimer:

- The DoD Preliminary Screening Tool enables developers to obtain a preliminary review of potential impacts to Long-Range and Weather Radar(s), Military Training Route(s) and Special Airspace(s) prior to official OE/AAA filing. This tool will produce a map relating the structure to any of the DoD/DHS and NOAA resources listed above. The use of this tool is **100 % optional** and will provide a first level of feedback and single points of contact within the DoD/DHS and NOAA to discuss impacts/mitigation efforts on the military training mission and NEXRAD Weather Radars. **The use of this tool does not in any way replace the official FAA processes/procedures.**

Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
  -Air Defense and Homeland Security radars(Long Range Radar)
  -Weather Surveillance Radar-1988 Doppler radars(NEXRAD)
  -Military Operations
- Enter either a single point or a polygon and click submit to generate a long range radar analysis map.
- Military Operations is only available for a single point.
- At least three points are required for a polygon, with an optional fourth point.
- The largest polygon allowed has a maximum perimeter of 100 miles.

Screening Type: NEXRAD **Geometry Type:** Single Point

Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
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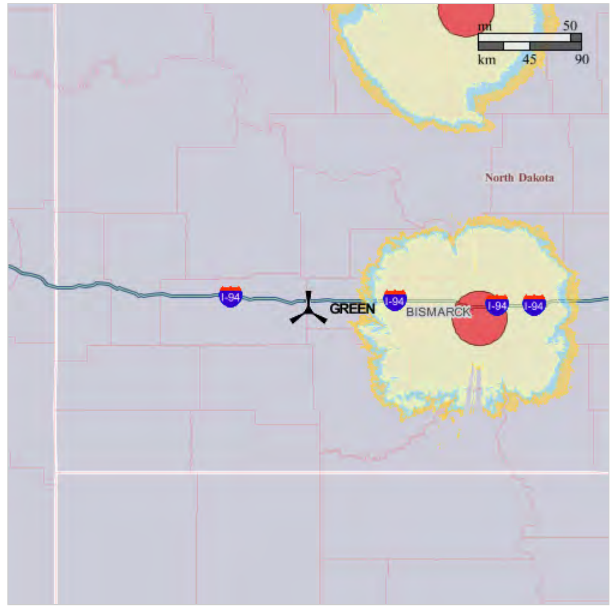
Horizontal Datum: NAD83



For more information, or to discuss the screening results, please contact NOAA at wind.energy.matters@noaa.gov

Map Legend:

- **Green:** Minimal to no impact to Weather Surveillance Radar-1988 Doppler (WSR-88D) weather radar operations. National Telecommunications & Information Administration (NTIA) notification advised.
- **Yellow:** RLOS Coverage At or Below 130m AGL. Impact likely to WSR-88D weather radar operations. Turbines likely in radar line of sight. Impact study required. NTIA notification advised.
- **Blue:** RLOS Coverage At or Below 160m AGL. Impact likely to WSR-88D weather radar operations. Turbines likely in radar line of sight. Impact study required. NTIA notification advised.
- **Gold:** RLOS Coverage At or Below 200m AGL. Impact likely to WSR-88D weather radar operations. Turbines likely in radar line of sight. Impact study required. NTIA notification advised.
- **Red:** Impact highly likely to WSR-88D weather radar operations and wind turbine electronics. Turbines likely in radar line of sight. Aeronautical study required. NTIA notification strongly advised.

Federal Aviation Administration

« OE/AAA

DoD Preliminary Screening Tool

Disclaimer:

- The DoD Preliminary Screening Tool enables developers to obtain a preliminary review of potential impacts to Long-Range and Weather Radar(s), Military Training Route(s) and Special Airspace(s) prior to official OE/AAA filing. This tool will produce a map relating the structure to any of the DoD/DHS and NOAA resources listed above. The use of this tool is **100 % optional** and will provide a first level of feedback and single points of contact within the DoD/DHS and NOAA to discuss impacts/mitigation efforts on the military training mission and NEXRAD Weather Radars. **The use of this tool does not in any way replace the official FAA processes/procedures.**

Instructions:

- Select a screening type for your initial evaluation. Currently the system supports pre-screening on:
  -Air Defense and Homeland Security radars(Long Range Radar)
  -Weather Surveillance Radar-1988 Doppler radars(NEXRAD)
  -Military Operations
- Enter either a single point or a polygon and click submit to generate a long range radar analysis map.
- Military Operations is only available for a single point.
- At least three points are required for a polygon, with an optional fourth point.
- The largest polygon allowed has a maximum perimeter of 100 miles.

Screening Type: Military Operations **Geometry Type:** Single Point

Point	Latitude Deg	Min	Sec	Dir	Longitude Deg	Min	Sec	Dir
1	46	49	24.54	N	102	5	6.31	W

Horizontal Datum: NAD83

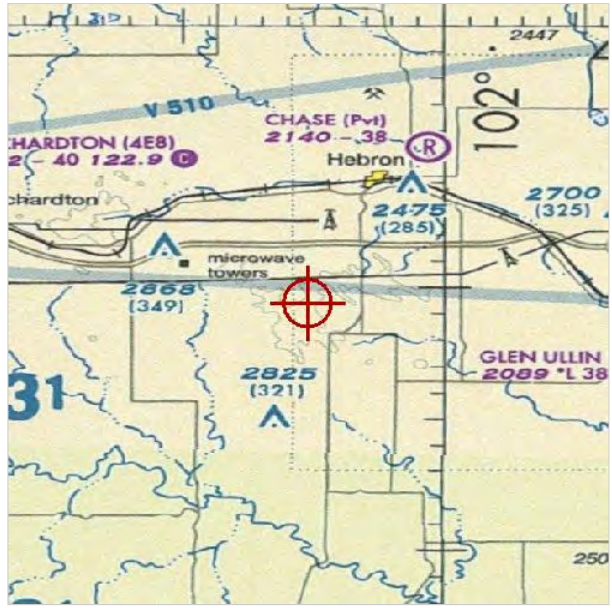
The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Dr. Thomas (Thom) H. Rennie at the USAF Regional Enviromental Coordinator at (214)767-4678 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Anthony M. Parisi, PE at the USN Regional Enviromental Coordinator at (805)989-9209 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact LTC Pete Kowal at the USA Regional Enviromental Coordinator at (425)227-2955 for confirmation and documentation.

The preliminary review of your proposal does not return any likely impacts to military airspace. Please contact Mr. Pat Christman at the USMC Regional Enviromental Coordinator at (760)725-2674 for confirmation and documentation.

This is a preliminary review of your proposal and does not preclude official FAA processes.
Your search data is not retained and the privacy of all your searches is assured.



Any questions interpreting the map, please email Steve Sample with your question/s and phone number at steven.sample@pentagon.af.mil

Appendix B –
Economic Coal Deposit Maps

North Dakota Geological Survey
100K Series: Dkin - c

Lignite Reserves
Dickinson 100K Sheet, North Dakota

Edward C. Murphy, State Geologist
Lynn D. Helms, Director Dept. of Mineral Resources

Edward C. Murphy
2005

There are just over one billion tons of economically mineable lignite within the Dickinson 100k Sheet (Murphy et al., in press). As much as 800 million tons of this reserve may be attributable to the Lehigh bed which extends throughout the northwestern corner of this map sheet. The Lehigh coal is more than 25 feet thick north of Dickinson (JK Ranch Deposit) and is 15 to 17 feet thick in the South Heart area (Murphy et al., 2000). JK Ranch (356 million tons), Belfield (201 million tons), West Dickinson (158 million tons), and Duck Creek (92 million tons) are the largest deposits in this map sheet (Murphy et al., in press).

The Lehigh bed is overlain by the Dickinson bed, both seams were mined in the Dickinson area. Underground mining began in the Lehigh area in the 1880s and switched to surface mining in the 1940s. The last coal mine to operate in Stark County was the JK Ranch mine which ceased operation in 1990. Great Northern Properties is currently studying the feasibility of establishing a coal mine and constructing a power plant south of the town of South Heart.

References
Murphy, E.C., Kruger, N.W., and Goven, G.E., 2000, The major coals in Billings, Golden Valley, and Stark counties, North Dakota: North Dakota Geological Survey Open-File Report 00-1, 42 p.
Murphy, E.C., 2006, in press. The Lignite Reserves of North Dakota, North Dakota Geological Survey Report of Investigation No. 104.

Study Area (HDR)

UNIT DESCRIPTIONS

Geology Undifferentiated

Area of Mined Lignite

L **Economic Coal Deposits**

Economic coal deposits are those that meet the minimum criteria established by coal companies operating surface mines in North Dakota. These economic criteria include a minimum cumulative coal thickness of ten feet-typicallyoccuring in less than two beds, a minimum individual bed thickness of at least 2.5 feet, a ratio of overburden to coalthickness of not more than 10:1, a minimum of 25 feet of overburden, and a maximum depth to coal of approximately 150 feet.

Geologic Symbols

Extent of Local Lignite Reserves

Data Points

Includes coal exploration NDGS/USGS drill holes, sub-surface mineral drill holes, oil & gas wells, and NDSWC drill holes.

Other Features

Water
Water - Intermittent
Water - Inundated
River/Stream - Perennial
River/Stream - Intermittent
Section Corners
County Boundary
Interstate Highway
State Highway
Paved Road
Unpaved Road

Scale 1:100,000

0 1 2 3 4

Miles

Mercator Projection 1927 North American Datum
Standard parallel 46°30' Central meridian 102°30'
USGS NED Shaded Relief - Vertical Exaggeration 9x

The North Dakota Geological Survey can publish on demand 1:24,000 scale quadrangle maps (24k - c series) of the mineable coal deposit in the Dickinson 100k sheet. These maps would include information on mineable coal thicknesses.

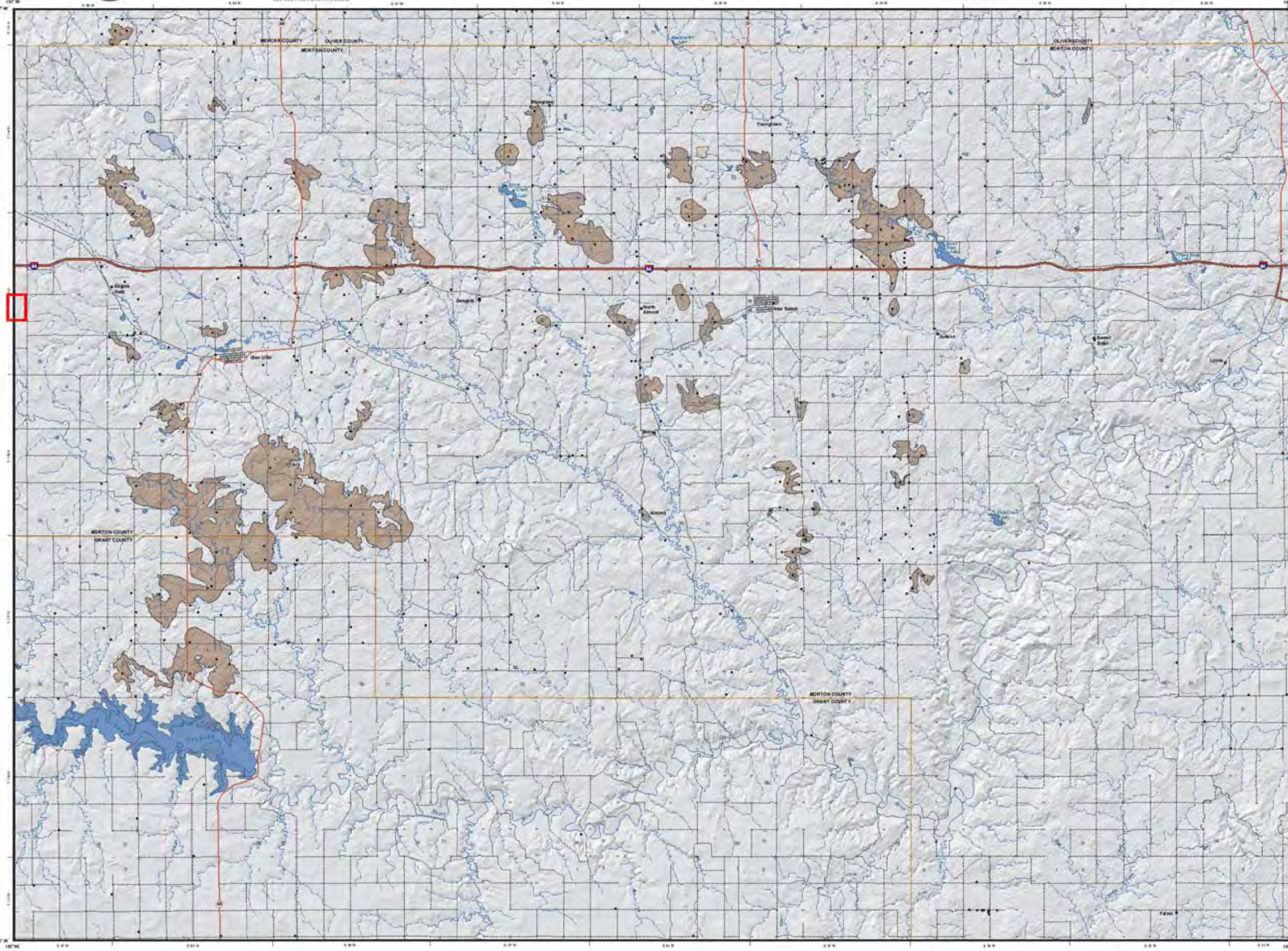
This project was supported, in part, by the U.S. Geological Survey, Department of Interior, under assistance awards 02ERAG0016 and 05ERAG0053.

Cartographic Compilation: Elroy L. Kadrmas

North Dakota Geological Survey
100K Series: GlnU - c

Lignite Reserves
Glen Ullin 100K Sheet, North Dakota

Edward C. Murphy, State Geologist
Lynn D. Helms, Director Dept. of Mineral Resources



Edward C. Murphy

2006

The Glen Ullin 100k sheet contains approximately 726 million tons of economically mineable lignite. The Heart Butte Creek (T137N, Rs 88 & 89W in Grant County) and Heart Butte Creek North (T138N, Rs 88 & 89W in Morton County) deposits account for approximately one-third of the mineable coal (275 million tons) in this map sheet. The Sweet Briar deposit, west-northwest of Sweet Briar Lake, contains about 90 million tons and is the second largest deposit in this area. The Twin Buttes deposit, three miles northwest of Dengate, is the only other deposit in the Glen Ullin sheet that exceeds 50 million tons (59 million). The thickest known coal within this sheet is twelve feet.

The Sentinel Butte and Bullion Creek Formations are the dominant rock units at the surface throughout this map sheet. According to the records of the North Dakota Public Service Commission, approximately 75 coal mines operated at one time or another in this area. Many of the mines operated for a short period of time and produced less than 100 tons of coal per year. The earliest coal mine in North Dakota was opened near Sims in 1873. The McCormick Coal Company, later the Deep Mine Coal Company, mined a nine-foot-thick coal at a depth of 200 feet by underground methods along the western outskirts of the town of New Salem. The mine operated from 1922 to 1951. Coal mining ceased within the Glen Ullin sheet in the 1960s when the Richter Mine (T139N, R88W, Section 13) and Carbon Mine near Almont closed.

References
Murphy, E.C., 2006. The Lignite Reserves of North Dakota: North Dakota Geological Survey Report of Investigation No. 104.

Study Area (HDR)

UNIT DESCRIPTIONS

Geology Undifferentiated

Geology Undifferentiated

L Economic Coal Deposits

Economic coal deposits are those that meet the minimum criteria established by coal companies operating surface mines in North Dakota. These economic criteria include a minimum cumulative coal thickness of ten feet-typicallyoccuring in less than two beds, a minimum individual bed thickness of at least 2.5 feet, a ratio of overburden to coalthickness of not more than 10:1, a minimum of 25 feet of overburden, and a maximum depth to coal of approximately 150 feet.

Geologic Symbols

Extent of Local Lignite Reserves

Data Points

Includes coal exploration NDGS/USGS drill holes, sub-surface mineral drill holes, oil & gas wells, and NDSWC drill holes.

Other Features

Water
Water - Intermittent
Water - Inundated
River/Stream - Perennial
River/Stream - Intermittent
Section Corners
County Boundary
Interstate Highway
State Highway
Paved Road
Unpaved Road

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Miles

Mercator Projection 1927 North American Datum
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USGS NED Shaded Relief - Vertical Exaggeration 9x

The North Dakota Geological Survey can publish on demand 1:24,000 scale quadrangle maps (24k - c series) of the mineable coal deposits in the Glen Ullin 100k sheet. These maps would include information on mineable coal thicknesses.

This project was supported, in part, by the U.S. Geological Survey, Department of Interior, under assistance awards 02ERAG0016 and 05ERAG0053.

Cartographic Compilation: Haryl L. Andrews

Appendix C –

North American Breeding Bird Survey Results

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Patuxent Wildlife Research Center

Species List

North American Breeding Bird Survey Route

GLEN ULLIN

Species	Birds/route	Route Change	Regional Change	Id Tips
Pied-billed Grebe *Podilymbus podiceps*	0.27	Route Change	Regional Change	Id Tips
Double-crest. Cormorant *Phalacrocorax auritus*	0.47	Route Change	Regional Change	Id Tips
American Bittern *Botaurus lentiginosus*	0.60	Route Change	Regional Change	Id Tips
Turkey Vulture *Cathartes aura*	0.07	Route Change	Regional Change	Id Tips
Canada Goose *Branta canadensis*	8.13	Route Change	Regional Change	Id Tips
Gadwall *Anas strepera*	1.33	Route Change	Regional Change	Id Tips
Mallard *Anas platyrhynchos*	22.27	Route Change	Regional Change	Id Tips
Blue-winged Teal *Anas discors*	1.47	Route Change	Regional Change	Id Tips
Northern Shoveler *Anas clypeata*	0.13	Route Change	Regional Change	Id Tips
Northern Pintail *Anas acuta*	0.67	Route Change	Regional Change	Id Tips
Northern Harrier *Circus cyaneus*	3.20	Route Change	Regional Change	Id Tips
Cooper's Hawk *Accipiter cooperii*	0.07	Route Change	Regional Change	Id Tips
Swainson's Hawk *Buteo swainsoni*	2.07	Route Change	Regional Change	Id Tips
Red-tailed Hawk *Buteo jamaicensis*	1.00	Route Change	Regional Change	Id Tips
Ferruginous Hawk	0.27	Route Change	Regional Change	Id Tips

Buteo regalis				
American Kestrel *Falco sparverius*	0.47	Route Change	Regional Change	Id Tips
Prairie Falcon *Falco mexicanus*	0.07	Route Change	Regional Change	Id Tips
Gray Partridge *Perdix perdix*	0.93	Route Change	Regional Change	Id Tips
Ring-necked Pheasant *Phasianus colchicus*	102.73	Route Change	Regional Change	Id Tips
Sharp-tailed Grouse *Tympanuchus phasianellus*	2.60	Route Change	Regional Change	Id Tips
Wild Turkey *Meleagris gallopavo*	0.67	Route Change	Regional Change	Id Tips
Sora *Porzana carolina*	0.40	Route Change	Regional Change	Id Tips
American Coot *Fulica americana*	0.47	Route Change	Regional Change	Id Tips
Killdeer *Charadrius vociferus*	9.60	Route Change	Regional Change	Id Tips
Willet *Catoptrophorus semipalmatu*	0.33	Route Change	Regional Change	Id Tips
Upland Sandpiper *Bartramia longicauda*	16.67	Route Change	Regional Change	Id Tips
Marbled Godwit *Limosa fedoa*	4.53	Route Change	Regional Change	Id Tips
Common Snipe *Gallinago gallinago*	3.53	Route Change	Regional Change	Id Tips
Wilson's Phalarope *Phalaropus tricolor*	0.80	Route Change	Regional Change	Id Tips
Ring-billed Gull *Larus delawarensis*	0.73	Route Change	Regional Change	Id Tips
Rock Dove *Columba livia*	2.47	Route Change	Regional Change	Id Tips
Mourning Dove *Zenaida macroura*	84.87	Route Change	Regional Change	Id Tips
Black-billed Cuckoo *Coccyzus erythropthalmus*	0.13	Route Change	Regional Change	Id Tips
Great Horned Owl *Bubo virginianus*	0.53	Route Change	Regional Change	Id Tips
Burrowing Owl *Athene cunicularia*	0.33	Route Change	Regional Change	Id Tips
Short-eared Owl *Asio flammeus*	1.07	Route Change	Regional Change	Id Tips

Common Nighthawk *Chordeiles minor*	0.80	Route Change	Regional Change	Id Tips
Belted Kingfisher *Ceryle alcyon*	0.13	Route Change	Regional Change	Id Tips
Red-headed Woodpecker *Melanerpes erythrocephalus*	0.07	Route Change	Regional Change	Id Tips
Downy Woodpecker *Picoides pubescens*	0.07	Route Change	Regional Change	Id Tips
Hairy Woodpecker *Picoides villosus*	0.07	Route Change	Regional Change	Id Tips
Northern Flicker *Colaptes spp.*	0.67	Route Change	Regional Change	Id Tips
Willow Flycatcher *Empidonax traillii*	0.47	Route Change	Regional Change	Id Tips
Willow/Alder Flycatcher *Empidonax spp.*	0.47	Route Change	Regional Change	Id Tips
Least Flycatcher *Empidonax minimus*	0.80	Route Change	Regional Change	Id Tips
Say's Phoebe *Sayornis saya*	1.53	Route Change	Regional Change	Id Tips
Western Kingbird *Tyrannus verticalis*	23.00	Route Change	Regional Change	Id Tips
Eastern Kingbird *Tyrannus tyrannus*	23.73	Route Change	Regional Change	Id Tips
Loggerhead Shrike *Lanius ludovicianus*	0.73	Route Change	Regional Change	Id Tips
Warbling Vireo *Vireo gilvus*	1.53	Route Change	Regional Change	Id Tips
Red-eyed Vireo *Vireo olivaceus*	0.07	Route Change	Regional Change	Id Tips
Black-billed Magpie *Pica pica*	0.33	Route Change	Regional Change	Id Tips
American Crow *Corvus brachyrhynchos*	1.47	Route Change	Regional Change	Id Tips
Horned Lark *Eremophila alpestris*	134.13	Route Change	Regional Change	Id Tips
Tree Swallow *Tachycineta bicolor*	1.07	Route Change	Regional Change	Id Tips
N. Rough-winged Swallow *Stelgidopteryx serripennis*	3.93	Route Change	Regional Change	Id Tips
Bank Swallow *Riparia riparia*	40.07	Route Change	Regional Change	Id Tips
Cliff Swallow	7.20	Route Change	Regional Change	Id Tips

Petrochelidon pyrrhonota				
Barn Swallow *Hirundo rustica*	11.60	Route Change	Regional Change	Id Tips
Black-capped Chickadee *Poecile atricapillus*	0.07	Route Change	Regional Change	Id Tips
Rock Wren *Salpinctes obsoletus*	0.20	Route Change	Regional Change	Id Tips
House Wren *Troglodytes aedon*	3.33	Route Change	Regional Change	Id Tips
Sedge Wren *Cistothorus platensis*	0.20	Route Change	Regional Change	Id Tips
Eastern Bluebird *Sialia sialis*	0.07	Route Change	Regional Change	Id Tips
American Robin *Turdus migratorius*	12.40	Route Change	Regional Change	Id Tips
Gray Catbird *Dumetella carolinensis*	0.07	Route Change	Regional Change	Id Tips
Brown Thrasher *Toxostoma rufum*	1.33	Route Change	Regional Change	Id Tips
European Starling *Sturnus vulgaris*	3.40	Route Change	Regional Change	Id Tips
Sprague's Pipit *Anthus spragueii*	0.20	Route Change	Regional Change	Id Tips
Cedar Waxwing *Bombycilla cedrorum*	1.53	Route Change	Regional Change	Id Tips
Yellow Warbler *Dendroica petechia*	4.13	Route Change	Regional Change	Id Tips
Common Yellowthroat *Geothlypis trichas*	3.73	Route Change	Regional Change	Id Tips
Chipping Sparrow *Spizella passerina*	0.53	Route Change	Regional Change	Id Tips
Clay-colored Sparrow *Spizella pallida*	3.27	Route Change	Regional Change	Id Tips
Vesper Sparrow *Pooecetes gramineus*	4.53	Route Change	Regional Change	Id Tips
Lark Sparrow *Chondestes grammacus*	1.00	Route Change	Regional Change	Id Tips
Lark Bunting *Calamospiza melanocorys*	195.13	Route Change	Regional Change	Id Tips
Savannah Sparrow *Passerculus sandwichensis*	15.93	Route Change	Regional Change	Id Tips
Grasshopper Sparrow *Ammodramus savannarum*	23.67	Route Change	Regional Change	Id Tips

Baird's Sparrow *Ammodramus bairdii*	5.53	Route Change	Regional Change	Id Tips
Le Conte's Sparrow *Ammodramus leconteii*	0.07	Route Change	Regional Change	Id Tips
Song Sparrow *Melospiza melodia*	0.27	Route Change	Regional Change	Id Tips
Chestnut-col. Longspur *Calcarius ornatus*	68.53	Route Change	Regional Change	Id Tips
Black-headed Grosbeak *Pheucticus melanocephalus*	0.13	Route Change	Regional Change	Id Tips
Lazuli Bunting *Passerina amoena*	0.07	Route Change	Regional Change	Id Tips
Dickcissel *Spiza americana*	1.40	Route Change	Regional Change	Id Tips
Bobolink *Dolichonyx oryzivorus*	16.87	Route Change	Regional Change	Id Tips
Red-winged Blackbird *Agelaius phoeniceus*	110.87	Route Change	Regional Change	Id Tips
Western Meadowlark *Sturnella neglecta*	193.73	Route Change	Regional Change	Id Tips
Yellow-head. Blackbird *Xanthocephalus xanthocepha*	3.40	Route Change	Regional Change	Id Tips
Brewer's Blackbird *Euphagus cyanocephalus*	10.00	Route Change	Regional Change	Id Tips
Common Grackle *Quiscalus quiscula*	47.53	Route Change	Regional Change	Id Tips
Brown-headed Cowbird *Molothrus ater*	113.47	Route Change	Regional Change	Id Tips
Orchard Oriole *Icterus spurius*	1.00	Route Change	Regional Change	Id Tips
Baltimore Oriole *Icterus galbula*	0.80	Route Change	Regional Change	Id Tips
Bullock's Oriole *Icterus bullockii*	0.13	Route Change	Regional Change	Id Tips
American Goldfinch *Carduelis tristis*	4.07	Route Change	Regional Change	Id Tips
House Sparrow *Passer domesticus*	33.53	Route Change	Regional Change	Id Tips

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Appendix D –
US Fish and Wildlife Service
And
North Dakota Fish and Game Department
Response Letters

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"VARIETY IN HUNTING AND FISHING"

NORTH DAKOTA GAME AND FISH DEPARTMENT

100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58501-5095 PHONE 701-328-6300 FAX 701-328-6352

October 22, 2010

Bruce Moreira
Environmental Scientist
HDR Engineering, Inc.
701 Xenia Avenue South, Suite 600
Minneapolis, MN 55416

Dear Mr. Moriera:

RE: Antelope Hills Wind Project – Mercer County, North Dakota
Sunflower Wind Project – Morton & Stark Counties, North Dakota
Silver Sage Wind Project – Oliver County, North Dakota

The North Dakota Game and Fish Department has reviewed this project for wildlife concerns.

Our primary concern with wind power development is the disturbance of native prairie associated with construction of turbines, access roads, and other associated facilities. We ask that work within native prairie be avoided to the extent possible. This could include micro-siting turbines onto adjacent previously disturbed land, locating access roads on existing section line trails rather than across undisturbed native prairie, etc.

The Golden Valley Wildlife Management Area (WMA) is located in the west half of section 32, T146N, R89W, within the project boundary of the Antelope Hills Wind Project. The Wilbur Boldt WMA is located in the northeast quarter of section 34, T142N, R83W, immediately adjacent to the project boundary of the Silver Sage Wind Project. We ask that wind turbines be set-back from WMA's a sufficient distance to minimize possible disturbance to wildlife.

The National Wetland Inventory indicates numerous wetlands within the proposed project area. We recommend that any unavoidable wetland impacts be replaced in kind, above-ground appurtenances not be placed in wetland areas, and no alterations be made to existing drainage patterns.

We also recommend that routine monitoring for avian and bat mortality be included as part of the facility maintenance plan for the life of the project. We would appreciate being kept informed as this project progresses, and if possible, we would like the GPS coordinates for each turbine after the site has been established.

Sincerely,

Paul Schadewald

Paul Schadewald
Chief
Conservation & Communication Division

js

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

DEC 1 2010

Mr. Bruce Moreira
Environmental Scientist
HDR Engineering, Inc.
701 Xenia Avenue South, Suite 600
Minneapolis, Minnesota 55416

Re: Sunflower Wind Project, Morton, and Stark Counties
Antelope Hills Wind Project, Mercer County
Silver Sage Wind Project, Oliver County

Dear Mr. Moreira:

This is in response to your August 6, 2010, solicitation of views and comments letters for the proposed Sunflower, Antelope Hills, and Silver Sage Wind Projects. The proposed projects would be developed by Sunflower Wind Project, LLC, Antelope Hills Wind Project, LLC, and Silver Sage Wind Project, LLC, all subsidiaries of Infinity Wind Power (Infinity).

The projects would consist of typical wind project construction, including erecting wind turbines and constructing associated facilities such as gravel access roads, an underground electrical collector system, electrical collector substation, and overhead transmission lines. The final locations of the turbines, access roads, and the electrical collector system have not yet been identified.

The following areas may be affected by the project:

Sunflower Wind Project:
Morton County: T. 138 N., R. 90 W., Sections 4-6
T. 139 N., R. 90 W., Sections 16-23, 26-33
Stark County: T. 138 N., R. 91 W., Sections 1, 2
T. 139 N., R. 91 W., Sections 23-25, 35, 36

Antelope Hills Wind Project:
Mercer County: T. 145 N., R. 88 W., Section 6, 7
T. 145 N., R. 89 W., Section 1-12
T. 145 N., R. 90 W., Sections 1-2, 11, 12
T. 146 N., R. 89 W., Sections 29-32
T. 146 N., R. 86 W., Sections 14, 15, 21-28, 33-36

Silver Sage Wind Project:

Oliver County: T. 142 N., R. 83 W., Section 13, 14, 23-26, 35, 36
T. 142 N., R. 82 W., Sections 8, 16-18, 19-22, 27-34
T. 141 N., R. 82 W., Section 3, 4

We offer the following comments under the authority of and in accordance with the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds", the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.), the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), and the National Environmental Policy Act (NEPA).

The U.S. Fish and Wildlife Service (Service) holds certain resources in trust and manages them for the benefit of the American people. These resources include migratory birds, inter-jurisdictional fish, federally-listed threatened and endangered species of plants and animals and their habitats, and units of the National Wildlife Refuge system. One goal of Service policy is that conservation of fish and wildlife resources receive equal consideration with other features of resource development, and that conservation actions are coordinated with those other forms of development. Another goal is to conserve, protect, and enhance fish and wildlife and their habitats to facilitate the balanced development of the Nation's natural resources.

Migratory Birds

Adequate consideration for avian and other wildlife resources early in the site evaluation process can help to minimize impacts and facilitate project review. Wind developers are encouraged to avoid impacts to prairie and other native habitats to the maximum extent practicable. Avoidance of impacts can be most effectively achieved by taking a landscape scale view, beginning with the process of prospecting for suitable sites for wind power development. Companies should assess not only those factors that indicate favorable conditions for development, such as a consistent wind resource, access to transmission, willing landowners, available financing, etc., but also anticipated impacts to wildlife and their habitats. Equal consideration should be accorded to wildlife resource conservation as to other features of development. When considering a project in a particular wind resource area, companies should use all available tools to ensure they have taken all practicable steps to avoid impacts to native habitats. This can be accomplished by utilizing GIS products depicting significant areas of contiguous prairie to site development in areas that are already impacted or fragmented. This analysis and potential site comparison should be accomplished prior to making any significant financial commitments, including entering into lease agreements with landowners. The Service's Interim Wind Turbine Siting Guidelines encourage project proponents to conduct a Potential Impact Index (PII) analysis on several potential sites within wind resource areas to assist in their selection of a wind power site that minimizes the potential to impact migratory birds and other wildlife. If the Service's interim guidelines were not used to evaluate potential sites for development, the project developer should indicate which method(s) they used to assess avian and other wildlife resource impacts before selecting this site for development. The alternatives analysis for the project should describe the potential project sites that were evaluated and why they were rejected based on potential trust resource impacts.

The Service has coordinated with the Avian Power Line Interaction Committee (APLIC) to develop guidelines to assist companies in formulating Avian Protection Plans (APP). The guidelines can be accessed from APLIC's website at http://www.aplic.org/. These plans are utility specific and designed to reduce operational risks that result from avian interactions with electric utility facilities, but we suggest they may be adapted to wind energy facilities. Wind energy projects have the potential to negatively affect bats as well as avian species. Therefore, we encourage project developers to formulate an Avian and Bat Protection Plan (ABPP) if bats migrate through or may be present in the project area. The Service has issued an August 03, 2010, white paper with guidance related to the development of project specific ABPPs (enclosed) for renewable energy facilities. Some of the things that the Service looks for in an APP or ABPP are typically a statement of company policy confirming the company's commitment to work cooperatively towards the protection of migratory birds and bats; identification of the process under which the company will obtain and comply with all necessary permits, including, but not limited to, nest relocation, temporary possession, depredation, salvage/disposal, and scientific collection; discussion of the company's plan for monitoring and reporting all incidents of avian or bat injury or mortality; a commitment to make all reasonable efforts to construct and modify infrastructure to reduce the incidence of avian and bat mortality; a mechanism to review existing practices, ensuring quality control and allowing for adaptive management; and a plan for providing adequate training for all appropriate utility personnel. An APP or ABPP reporting system is important to help the company pinpoint areas of concern by tracking both the specific locations where mortalities may be occurring, as well as the extent of such mortalities and the remedial actions taken/planned to address identified problem areas.

To minimize the electrocution hazard to birds, the Service, with support from the Rural Utilities Service, recommends that new or updated overhead power lines be constructed in accordance with the current guidelines for preventing raptor electrocutions. The recommended guidelines can be found in "2006 Suggested Practices for Avian Protection on Power Lines". To increase power line visibility and reduce bird fatalities resulting from collisions with power lines, the Service recommends all new power lines that cross or run adjacent to rivers or large wetlands be modified according to "Mitigating Bird Collisions with Power Lines: The State of the Art in 1994". Both publications can be obtained by writing or calling the Edison Electric Institute, P.O. Box 266, Waldorf, Maryland 20604-0266, (1-800-334-5453) or visiting their website at www.eei.org.

The MBTA prohibits the taking, killing, possession, and transportation, (among other actions) of migratory birds, their eggs, parts, and nests, except when specifically permitted. While the Act has no provision for allowing unintentional take, the Service realizes that some birds may be killed during wind project construction and operation even if all known reasonable and effective measures to protect birds are used. The Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take of migratory birds. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, OLE focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent, and effective measures to avoid that take. Companies are encouraged to work closely with Service biologists to identify available protective measures when developing project plans and/or avian protection plans, and to implement those measures prior to/during project construction and operation.

To the extent practicable, construction should be scheduled for late summer or fall/early winter so as not to disrupt waterfowl or other wildlife during the breeding season (February 1 to July 15). If work is proposed to take place during the breeding season or at any other time which may result in the take of migratory birds, their eggs, or active nests, the Service recommends that the project proponent take all practicable measures to avoid and minimize take, such as maintaining adequate buffers, to protect the birds until the young have fledged. The Service further recommends that if field surveys for nesting birds are conducted with the intent of avoiding take, that any documentation of the presence of migratory birds, eggs, and active nests, along with information regarding the qualifications of the biologist(s) performing the surveys, and any avoidance measures implemented at the project site be maintained. Should surveys or other available information indicate a significant impact to migratory birds, the Service requests that this office be contacted for further consultation on the extent of the impact and the long-term implications of the intended use of the project on migratory bird populations.

Bald and Golden Eagles

The BGEPA, prohibits anyone from taking bald eagles, including their parts, nests, or eggs without a permit issued by the Secretary of the Interior. The Act provides criminal and civil penalties for persons who take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof. The Act defines take as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

While the bald eagle tends to be more closely associated with forested areas near water (Buehler 2000), they have been found nesting in single trees several miles from the nearest water body. Especially early in the nesting season, eagles can be very sensitive to disturbance near the nest site and may abandon their nest as a result of low disturbance levels, even from foot traffic. A buffer of at least 1/2 mile should be maintained for all bald and golden eagle nests. A permit is required for any take of golden eagles or their nests. Permits to take golden eagles or their nests are available only for legitimate emergencies and as part of a program to protect golden eagles.

The Service is not currently aware of any bald or golden eagle nests in the immediate vicinity of the project areas. There are numerous documented bald eagle nests in Mercer, Morton, and Oliver Counties. The Service recommends surveying for bald and golden eagle nests out ½ mile from the proposed project areas. If any nests are found during the survey, the Service recommends that Infinity document the location and contact the Service for further coordination. The Service has developed national guidelines regarding bald eagle management and recommends that Infinity review these guidelines during the project planning process. The guidelines are available at http://www.fws.gov/southdakotafieldoffice/NationalBaldEagle ManagementGuidelines.pdf.

Threatened and Endangered Species

A list of federally threatened and endangered species that may occur within the proposed project's area of influence is (enclosure 1). This list fulfills requirements of the Service under the ESA.

If a Federal agency authorizes, funds, or carries out a proposed action, the responsible Federal agency, or its delegated agent, is required to evaluate whether the action "may affect" listed species or critical habitat. This includes funding available from the U.S. Treasury Department under the American Recovery and Reinvestment Act. If the Federal agency or its designated agent determines the action "may affect, is likely to adversely affect" listed species or result in destruction or adverse modification of critical habitat, the responsible Federal agency shall request formal section 7 consultation with this office. If the evaluation shows a "no effect" determination for listed species or critical habitat, further consultation is not necessary. If a private entity receives Federal funding for a construction project, or if any Federal permit or license is required, the Federal agency may designate the fund recipient or permittee as its agent for purposes of informal section 7 consultation. The funding, permitting, or licensing Federal agency is responsible to ensure that it's actions comply with the ESA, including obtaining concurrence from the Service for any action that may affect a threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.

The Aransas Wood Buffalo Population (AWBP) of whooping cranes is the only self sustaining migratory population of whooping cranes remaining in the wild. These birds breed in the wetlands of Wood Buffalo National Park in Alberta and the Northwest Territories of northern Canada, and overwinter on the Texas coast. Whooping cranes in the AWBP annually migrate through North Dakota during their spring and fall migrations.

Endangered whooping cranes have been documented using stopover habitat in the vicinity of this proposed project area. The proposed project areas are located within those portions of the whooping crane migration corridor that include 75-95% of all confirmed whooping crane sightings in North Dakota (enclosure 2). The presence of suitable roosting and feeding habitat for whooping cranes, and location within the whooping crane migration corridor, document the potential for whooping crane presence in the proposed project area. A wind energy project in this wind resource area has the potential to affect whooping cranes during their annual spring and fall migration through North Dakota. Potential effects may be direct (e.g. collision mortality) or indirect (e.g. avoidance of the site resulting in cranes seeking alternate habitat). The best available information indicates that whooping cranes avoid stopover habitat that is developed with wind energy appurtenances, particularly wind turbines. This avoidance may deny them the use of important habitat, and thus may result in an adverse effect in the form of harm by significant habitat modification. Whooping cranes use migration stopover habitat opportunistically and may not use the same stopovers annually. Whooping cranes often stop wherever they happen to be late in the day when they find conditions no longer suitable for migration. This tendency can make for a very unpredictable pattern of stopover use, depending on daily weather conditions. The Service recommends mapping wetlands at the project site within one (1) mile of all turbines, identifying potentially suitable whooping crane stopover habitat, and analyzing the potential effects to migrating whooping cranes from loss of use of this habitat for migration stopovers.

The interactions of whooping cranes with wind turbines and wind farms are currently not fully known, although it is expected that these large birds with relatively low maneuverability are susceptible to mortality via collisions with turbines. The highest known source of mortality to fledged whooping cranes is from striking power lines. Currently, collisions with power lines have accounted for the death or serious injury of at least 46 whooping cranes since 1956. If power lines will be constructed in association with this project, the Service recommends they be placed underground to avoid collision mortality. If underground construction is not practicable, we recommend installation and maintenance of visual marking devices on all new power lines within one mile of potentially suitable whooping crane stopover habitat, and an equal length of existing power line in the whooping crane migration corridor within one mile of potentially suitable whooping crane habitat.

Any party is responsible to ensure that their activities comply with pertinent Federal Laws, including the ESA, BGEPA, and the MBTA, even in the absence of a Federal nexus. If an activity is likely to result in "take" of a federally-listed species, the project proponent or landowner has the option of developing a Habitat Conservation Plan (HCP) in consultation with FWS. Using the voluntary guidelines referenced above will help to ensure compliance with the MBTA and BGEPA. The Service requests that Infinity respond to the Service indicating how Infinity intends to demonstrate compliance with applicable Federal wildlife laws. While the projects' potential for take has not yet been determined, Infinity should note that if "take" of any federally listed threatened or endangered species is anticipated, Infinity is advised to develop an HCP and apply for an Incidental Take Permit (ITP).

Fish and Wildlife Service Property Interests

The Service administers Waterfowl Production Areas owned in fee title as well as wetland and grassland easements throughout North Dakota. A review of Service realty records for the proposed project area indicates Service property interests are located in the proposed project area. Wetland easements are legal agreements with private landowners that permanently protect wetland basins from being drained, burned, leveled, or filled. Grassland easements are legal agreements with landowners that permanently protect grassland vegetation, primarily native prairie, from being destroyed or developed. Grassland easements prevent these grasslands from being converted to cropland. Mowing, haying, and grass seed harvesting must be delayed on grassland easements until after July 15 each year to protect grassland nesting birds. The primary responsibility in protecting these interests is to review all proposed uses to ensure that the requests are compatible with Service easement regulations and various laws and policies. These comments and suggestions are made in an attempt to accomplish three goals: 1) avoid impacts to Service grassland and wetland easements in the project area as much as possible; 2) if unavoidable, ensure that any proposed turbine and associated infrastructure impacts (roads, buried collection lines, transmission lines, sub-stations, etc.) on any Service easement areas are kept to an absolute minimum; and 3) investigate all potential alternatives to eliminate or reduce impacts to easement areas to protect the integrity of the easement.

High Value Habitat Avoidance

High value wildlife habitat types in North Dakota include native prairies, wetlands, wooded draws, and riparian forests. We recommend that construction of wind towers and appurtenant facilities in the above habitat types be avoided whenever possible.

Since the 1800s, North Dakota has lost approximately 75 percent of its native grasslands, primarily due to crop production. Native prairie has significant natural resource values including:

- Provides habitat for a number of migratory and resident grassland birds whose populations are declining.
- Provides nesting habitat for millions of waterfowl.
- Contains 200-300 plant species, which provide genetic diversity important to agriculture and medicine.
- Provides habitat for thousands of insects including the Dakota skipper, a candidate species for listing under the ESA, and other butterflies (Ex: Regal fritillary, Tawny crescent).
- Crucial for soil and water conservation.
- Provides recreational opportunities (hunting, bird watching/wildlife observation, hiking).
- Living laboratories for scientific research.

Our review of NWI maps indicates that wetland areas are located within the project areas. NWI data can be accessed directly by visiting their website at (wetlands.fws.gov). Section 404 of the Clean Water Act regulates placement of fill materials in certain wetlands. A Corps of Engineers' 404 permit may be required if fill material will be placed in aquatic sites, including wetlands.

The project proponent should contact Mr. Dan Cimarosti, Regulatory Office, Corps of Engineers, 1513 South 12th Street, Bismarck, North Dakota 58504 (701-255-0015), to determine their permit requirements. If a 404 permit is required, the Service will also provide recommendations on this project to the Corps.

Construction activities should be conducted in a manner that will minimize impacts to the wildlife and the existing habitat in the project area. To help avoid impacts, we recommend the project proponent:

- Reseed disturbed native prairie with a diverse native grass/forb seed mixture. Obtain seed stock from nurseries within 250 miles of the project area to insure the particular cultivars are well adapted to the local climate.
- Minimize grassland disturbance by using fewer, larger turbines, and limiting new road construction.
- Design meteorological towers to be self standing (no guywires). If towers must be guyed, install and maintain appropriate visual line marking devices to reduce the potential for avian collision mortality
- Locate appurtenant facilities to avoid placement of fill in wetlands along the route.
- Install and maintain appropriate erosion control measures to reduce sedimentation and water quality degradation of wetlands and streams near the project area.
- Replace unavoidable wetland losses with functionally equivalent wetlands.

Research, Monitoring, and Assessment

We recommend project proponents conduct collision monitoring studies designed to determine the effect of several factors, such as site selection, turbine designs, the layout of wind plants, wind plant operations, habitat alteration, and changes in available perching and nesting sites, on bird deaths. Annual reports outlining the results of these monitoring studies should be submitted to this office. The Avian Subcommittee of the National Wind Coordinating Committee (NWCC) has developed a guidance document to assist wind energy developers in designing studies that will produce credible and comparable results of avian interaction with wind power plants. The NWCC document, "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," can be obtained by contacting the National Wind Coordination Committee, c/o RESOLVE, 1255 23rd Street, Suite 275, Washington, D.C. 20037, or by visiting their website at (www.nationalwind.org).

We wish to stress the importance of implementing the recommendations contained in this letter, and of coordinating in a substantive and ongoing way with this office as your project planning proceeds. The way in which your company implements the Service's recommendations will determine whether or not your projects can be certified as complying with Federal wildlife laws.

Thank you for the opportunity to provide comments. If you require further information as project planning proceeds, please contact Breanne Vander Naald of my staff, or contact me directly, at (701) 250-4481, or at the letterhead address.

Sincerely,

Jeffrey K. Towner

Jeffrey K. Towner
Field Supervisor
North Dakota Field Office

Enclosures (3)

cc: Army Corps of Engineers, Bismarck
(Attn: Dan Cimarosti)
Director, ND Game & Fish, Bismarck
(Attn: Paul Schadewald)

Wind Power GeoPlanner™

Licensed Microwave Report

Sunflower Wind Project

Prepared on Behalf of
Sunflower Wind Project, LLC

September 27, 2010

COMSEARCH®
A CommScope Company

Table of Contents

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: Sunflower Wind Project

County: Stark and Morton

State: North Dakota

Total Microwave Paths	Paths with Obstructions	Total Turbines	Turbine Obstructions
15	N/A	N/A	N/A

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2]. The area of interest was defined by the client and encompasses the planned turbine locations. 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.

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

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
d_1 = Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2 = Distance from antenna 2 to a specific point in the microwave path, kilometers

For worst case Fresnel zone calculations, $d_1 = d_2$

[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 spreadsheet and shapefiles[3].

Discussion of Potential Obstructions

For this project, turbine locations were not provided; thus we could not determine if any potential obstructions exist between the planned wind turbines and the incumbent microwave paths. If the latitude and longitude values for turbine locations are provided, Comsearch can identify where a potential conflict might exist.

[3] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 13 projected coordinate system.

3. Tables and Figures

Figure 1: Area of Interest

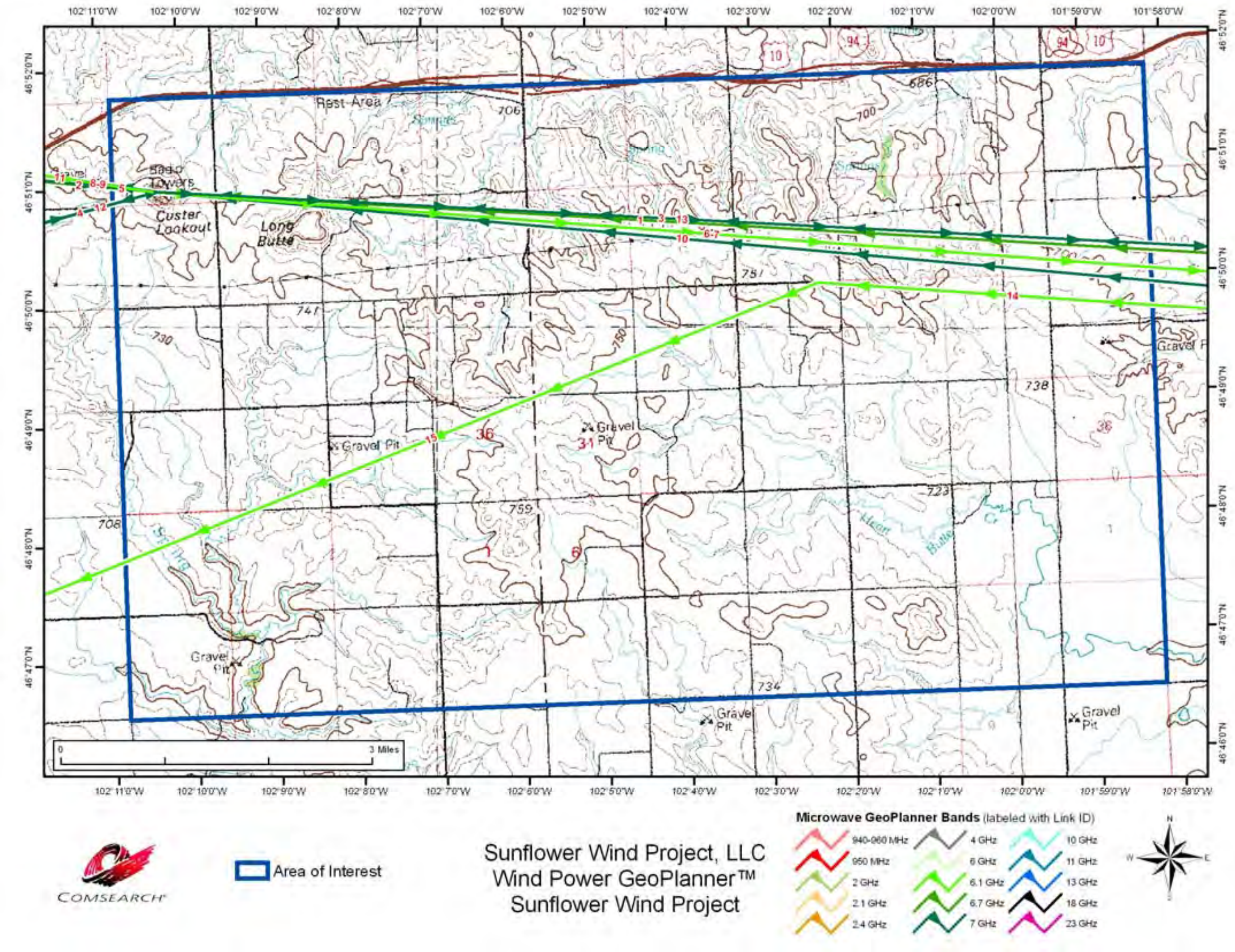


Figure 2: Microwave Paths that Intersect the Area of Interest

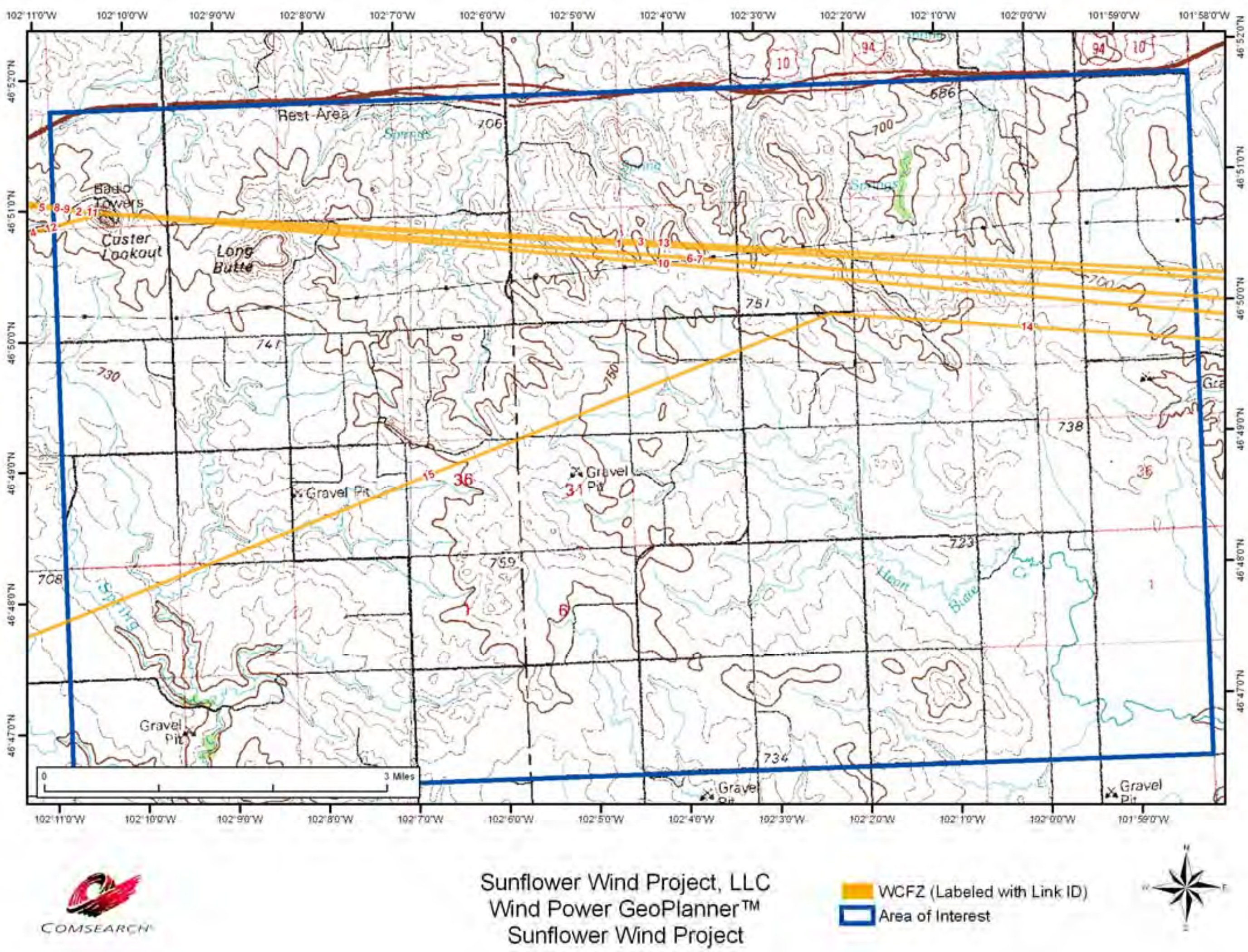


Figure 3: Microwave Paths with WCFZ Buffers

ID	Site Name 1	Site Name 2	Callsign 1	Callsign 2	Band	Licensee	WCFZ (m)
1	NEW SALEM	ANTELOPE	KVY57	KVY59	Upper 6 GHz	BNSF Railway Company	25.61
2	OLD HWY 10	ANTELOPE	KVY58	KVY59	Upper 6 GHz	BNSF Railway Company	20.87
3	NEW SALEM	ANTELOPE	WHB888	RXONLY	7 GHz	PRAIRIE PUBLIC BROADCASTING INC	25.03
4	ANTELOPE	DICKINSON	WHB889	RXONLY	7 GHz	PRAIRIE PUBLIC BROADCASTING INC	25.00
5	DICKINSON	ANTELOPE	WHQ215	RXONLY	7 GHz	HOAK MEDIA OF DAKOTA LICENSE, LLC	22.44
6-7	CUSTERS LOOK	NEW SALEM	WPON243	WPON242	Lower 6 GHz	Peach Acquisitions LLC	26.67
8-9	DICKINSON	CUSTERS LOOK	WPON244	WPON243	Lower 6 GHz	Peach Acquisitions LLC	22.87
10	NEW SALEM	ANTELOPE	WPON897	RXONLY	7 GHz	PRIME CITIES BROADCASTING, INC.	25.04
11	ANTELOPE	DICKINSON	WPON898	RXONLY	7 GHz	PRIME CITIES BROADCASTING, INC.	21.51
12	KDSE TX	ANTELOPE	WPSI941	RXONLY	7 GHz	PRAIRIE PUBLIC BROADCASTING INC	25.01
13	ANTELOPE	NEW SALEM	WPSI987	RXONLY	7 GHz	PRAIRIE PUBLIC BROADCASTING INC	25.03
14	NEW SALEM	HEBRON	WPYN766	WPYN767	Lower 6 GHz	PRAIRIE PUBLIC BROADCASTING INC	24.22
15	HEBRON	LEFOR	WPYN770	WPYN757	Lower 6 GHz	PRAIRIE PUBLIC BROADCASTING INC	23.80

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

AVIATION SYSTEMS INC.
Aviation Consultants

October 1, 2010

Mr. Jon Koehn
Infinity Wind Power, Inc.
3760 State Street, Suite 102
Santa Barbara, CA 93105

Re: Sunflower ND Project, 10-N-0614.004

Dear Mr. Koehn:

Pursuant to your request, Aviation Systems, Inc. (ASI), has performed an initial evaluation of the feasibility of the Sunflower ND Project. The purpose of the study is to determine the feasibility of erecting wind turbines with a tip height of up to 428 feet above ground level (AGL), from an aviation and airspace point of view. We have reviewed the above referenced project against aviation and airspace criteria set forth in Federal Aviation Regulation (FAR) Part 77 (14 CFR 77) *Objects Affecting Navigable Airspace*; FAA Order 8260.3B, the *United States Standard for Terminal Instrument Procedures* (TERPs) and; FAA Order JO 7400.2G, *Procedures for Handling Airspace Matters*. The criteria in these documents comprise the factors the Federal Aviation Administration (FAA) will use in evaluating the aeronautical compatibility of the project when it is submitted for their official regulatory review. Our findings include the following:

- The project consists of proposed wind turbines to be located within an approximate area 6.38 x 4.19 nautical miles (NM) in the State of North Dakota.

- Ground elevations within the area range from 2300 feet above mean sea level (AMSL) to 2670 feet AMSL. With a proposed turbine height of 428 feet AGL, the highest point of the project could be up to 3098 feet AMSL. See attached map depicting the project and surrounding area.

- The nearest public airport is Glenn Ullin Regional (D57) Airport, located 7.98 NM, east of the project centerpoint. The project would not impact airport operations.

- The project would not impact Minimum Vectoring Altitudes (MVA) or Enroute Low Altitude Airways.

- The project is outside the boundaries of any Military Operations Areas or Restricted Areas.

- Development is unlikely to impact Air Defense and Homeland Security radars (Green Zone on Federal Radar and Military Airspace Preliminary Screening Tool). Further radar impact study is not necessary.

- Minimal to no impact to Weather Surveillance Radar-1988 Doppler (WSR-88D) weather radar operations. Further radar impact study is not necessary.

- In the east section of the project, within the broken green map line, a future RNAV (GPS) Approach to Runway 11 at D57 may limit structure heights below 3148 feet AMSL.

- The following list of Sunflower ND Project Sectors indicates the vertical AMSL limits of each listed procedure:

  - Sector A: 3148' AMSL – "Target Height"

- Within Sector A, 428 foot turbines are feasible and should receive Determinations of No Hazard from the FAA.

Additionally, any structure over 200 feet AGL, in this case the turbines, requires notice to the FAA and also would require lighting in accordance with FAA Advisory Circular (AC) 70/7460-1K, Change 2. After suitable locations are selected and at your request, ASI can handle the FAA filing process pursuant to the notice requirements of FAR Part 77 and follow-up until the No Hazard Determinations are issued by the FAA. We will be able to negotiate selective lighting so that not all of the turbines would require the extra expense of installing and maintaining lights.

FAA makes changes to the National Aviation System everyday. New approaches are published, departure procedures are changed, new runways are planned, MVAs are modified, etc. Therefore, it is possible for the study findings to become obsolete in a relatively short time period. We recommend that prior to filing specific sites within the study area, the study findings be reviewed for currency. Studies greater than 12 months old should automatically be re-visited and their findings confirmed.

Our findings are intended as a planning tool, in conjunction with the resolution of other pertinent issues. Actual construction activities are not advisable until the FAA Determinations of No Hazard are issued.

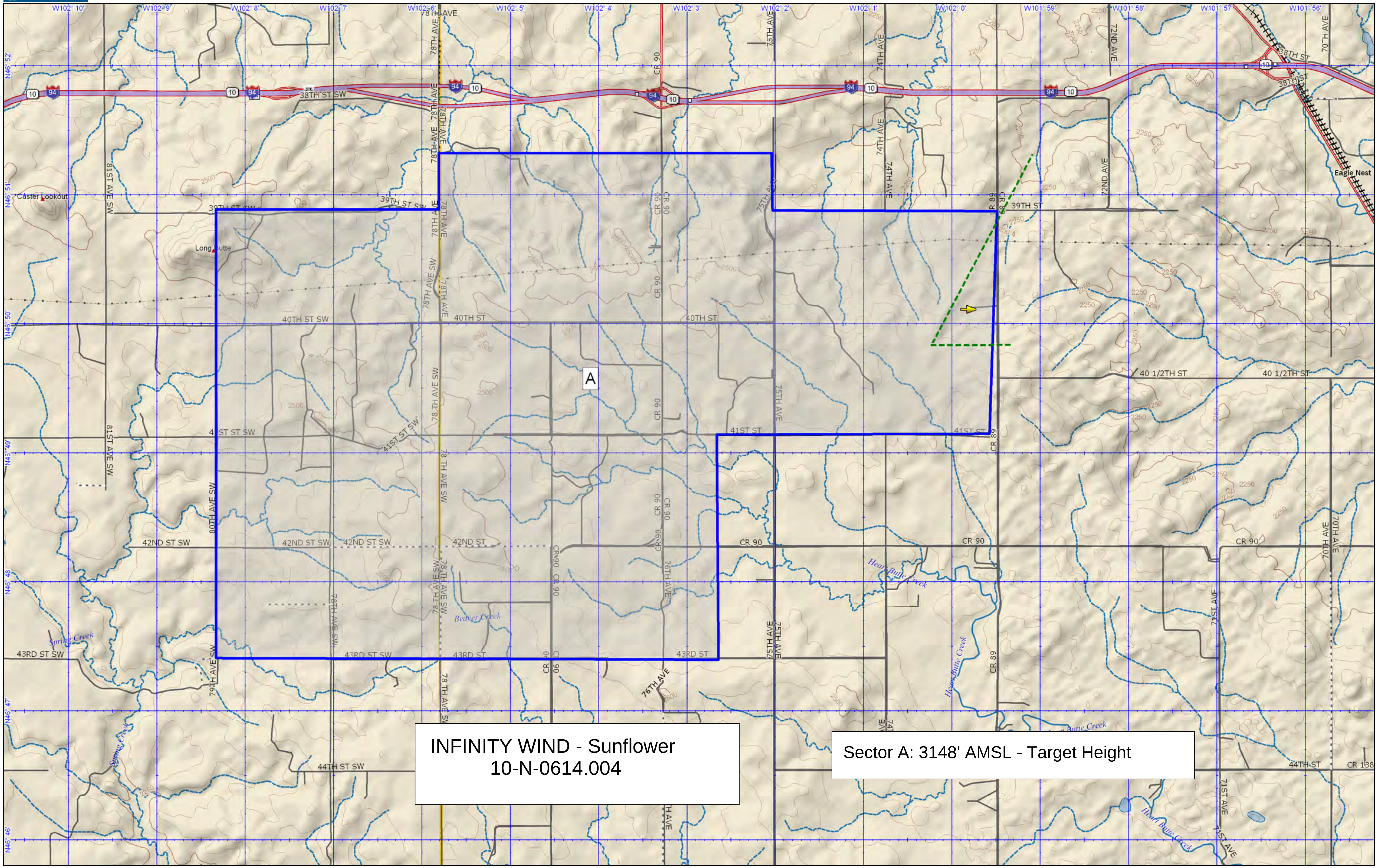
Sincerely,

Gary M. Allen

Gary M. Allen, Esq., Ph.D.
President

Attachments

DeLORME



Data use subject to license.

www.delorme.com

TN

MN (7.6°E)

Scale 1 : 50,000

1" = 4,166.7 ft

Data Zoom 12-0

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Sunflower Wind Project Class III Intensive Cultural Resources Inventory

The Class III Cultural Resources Survey contains sensitive material and is not included here. Interested parties my contact Western or the North Dakota State Historic Preservation Office to obtain access to this document.

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Appendix E
Biological Assessment

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Appendix F
Letter Request for Voluntary Conferencing, Western to USFWS

Department of Energy
Western Area Power Administration
Upper Great Plains Customer Service Region
P.O. Box 35800
Billings, MT 59107-5800

B0403

MAY 1 2 2014

Mr. Kevin Shelley, Acting Assistant Field Supervisor
U. S. Fish and Wildlife Service
North Dakota Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926

Subject: Request for Voluntary Conferencing on the Biological Assessment (BA) for the Sunflower Wind Project.

Dear Mr. Shelley:

Western Area Power Administration (Western), an agency within the Department of Energy (DOE), markets Federal hydroelectric power to preference customers, as specified by law. Sunflower Wind Project, LLC (Sunflower Wind), a subsidiary of Infinity Wind Power, has applied to Western to interconnect their proposed wind energy generation project, Sunflower Wind, to Western's power transmission system.

Sunflower Wind is located in Morton and Stark Counties, North Dakota to the south of the town of Hebron. The Project is targeted to be operational by the end of 2015. The wind turbines would be connected together by a 34.5 kilovolt (kV) underground collection line system that would connect with a Project collection substation. The output of the Project will be stepped up at the project substation to 230 kV and transmitted through a new 230 kV overhead transmission line. The new proposed transmission line would be approximately 1 mile in length and will terminate at a new switchyard facility on the existing Dickinson - Mandan 230 kV line. Other ancillary facilities that would be developed in conjunction with the project include one permanent meteorological tower, new access roads, and an operations and maintenance building.

Pursuant to Section 7(a)(2) of the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq.* (ESA) and as part of our agency's compliance with the requirements of section 102 of the National Environmental Policy Act of 1969 (42 U.S.C. 4332), Western will be preparing a BA for the purpose of identifying any endangered or threatened species which is likely to be affected by such action. During the development of the Project BA, several candidate species were proposed for listing and new species were proposed as well. The BA reflects the new status of those species. For ESA informal consultations and development of BAs, Western's policy is to treat candidate and proposed species as if they were listed species for analysis of effects and effects determination.

Therefore, though not meeting the threshold pursuant to Section 7(a)(4) of the ESA, Western requests voluntary conferencing on the following candidate and proposed species for the Project:

Sprague's pipit (*Anthus spragueii*)	Candidate
Northern long-eared bat (*Myotis septentrionalis*)	Proposed
Rufa red knot (*Calidris canutus rufa*)	Proposed

Western believes the species information and effects analysis and determination within the BA will meet the requirements for conferencing on these species and help to streamline the ESA consultation process in the event that it might be listed in the future.

I look forward to your response. If you have any questions regarding this request, please feel free to contact Mr. Lou Hanebury at (406) 255-2812.

Sincerely,

Matt Marsh

Matt Marsh
Environmental Manager

cc:
Casey Willis, Infinity Wind Power