Fredrikson & BYRON, P.A.

April 8, 2013

VIA FEDERAL EXPRESS

Mr. Darrell Nitschke
Executive Secretary
North Dakota Public Service Commission
600 E. Boulevard, Dept. 408
Bismarck, ND 58505-0480

RE: Application for a Certificate of Site Compatibility for Courtenay Wind Farm, LLC's Courtenay Wind Farm Project in Stutsman County, North Dakota Case No. PU-13-64

Dear Mr. Nitschke:

Courtenay Wind Farm, LLC ("CWF"), respectfully submits herewith an application for a Certificate of Site Compatibility for the Courtenay Wind Farm Project, to be located in Stutsman County, North Dakota. CWF submits the application pursuant to Chapter 49-22 of the North Dakota Century Code and Article 69-06 of the North Dakota Administrative Code.

In accordance with Section 69-06-04-01(2) of the North Dakota Administrative Code, the original and ten (10) copies of the application and this letter are enclosed, as well as a CD that contains an electronic copy of the application and this letter. A check in the amount of $85,000.00 for the filing fee required pursuant to Section 49-22-22 of the North Dakota Century Code is also enclosed.

If you need any additional information or have any questions, please let me know.

Sincerely,

Mollie M. Smith

MOLLIE M. SMITH

MMS/ms
Enclosures

cc: Mr. Patrick Smith

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5 PU-13-64 Filed: 4/12/2013 Pages: 408
Application for Certificate of Site Compatibility

Courtenay Wind Farm, LLC

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North Dakota Public Service Commission

Application for a Certificate of Site Compatibility
Case No. PU-13-64
Courtenay Wind Farm

Stutsman County, ND

Submitted by:
Courtenay Wind Farm, LLC
7650 Edinborough Way
Suite 725
Edina, MN 55435
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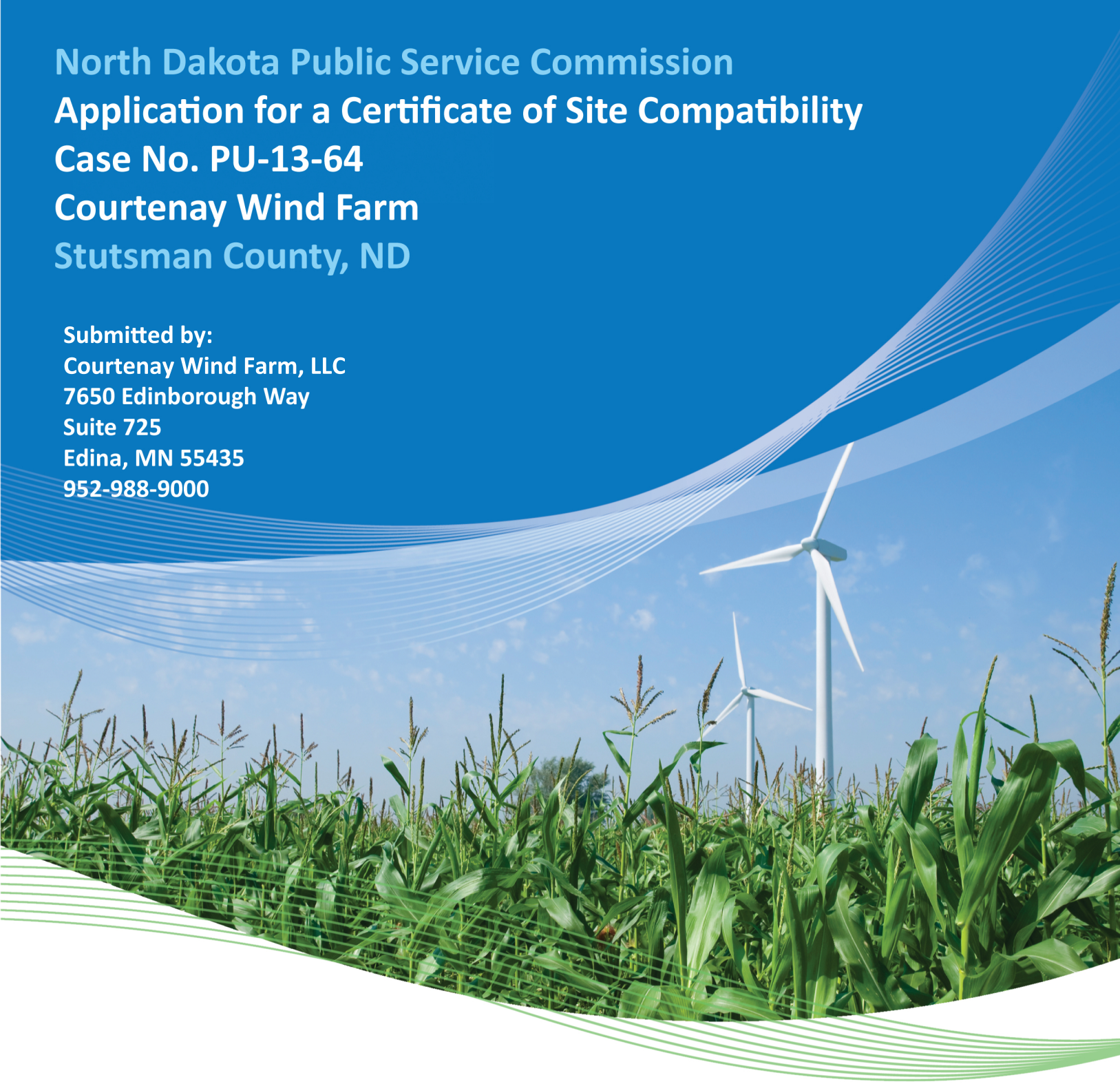

COURTENAY WIND FARM
Stutsman County, ND

GERONIMO® ENERGY

Application to the North Dakota Public Service Commission for a Certificate of Site Compatibility

Courtenay Wind Farm

Case No. PU-13-64

April 5, 2013

Submitted by:
Courtenay Wind Farm, LLC
7650 Edinborough Way
Suite 725
Edina, MN 55435

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Acronyms and Abbreviations

AM	amplitude modulation
ANSI	American National Standards Institute
APE	Area of Potential Effect
ASOS	Automated Surface Observing Systems
BMPs	Best Management Practices
Certificate	Certificate of Site Compatibility
CWA	Clean Water Act
Commission	North Dakota Public Service Commission
CWF	Courtenay Wind Farm, LLC
dB	Decibels
dBA	A-weighted decibel scale
dbC	C-weighted decibel scale
DEM	Digital Elevation Model
DoD	U. S. Department of Defense
EMFs	electromagnetic fields
EPA	U. S. Environmental Protection Agency's
ESA	Endangered Species Act
FA&A	Federal Airways & Airspace
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FCC	Federal Communications Commission
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Maps
FM	frequency modulation
Geronimo	Geronimo Wind Energy, LLC
GIS	Geographic Information Systems
ICBM	Intercontinental Ballistic Missile
IPP	Independent Power Producer

kV	Kilovolt
LBWEGs	Land Based Wind Energy Guidelines
LiDaR	Light Detection and Ranging
Literature Search	Class I Cultural Resource Literature Search
LWCF	Land and Water Conservation Fund
MERRA	Modern Era Retrospective Analysis for Research and Applications
MISO	Midwest Independent System Operator
MLRA	Major Land Resource Area
MW	Megawatts
MWh	Megawatt hours
NDAC	North Dakota Administrative Code
NDAWN	North Dakota Agricultural Weather Network
NDDOH	North Dakota Department of Health
NDGFD	North Dakota Game and Fish Department
NDPRD	North Dakota Parks and Recreation Department
NDSWC	North Dakota State Water Commission
NED	National Elevation Dataset
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NERC	North American Electric Reliability Corporation
NHI	Natural Heritage Inventory
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NPL	Superfund National Priorities List
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWS	National Weather Service
O&M	Operations and maintenance
OTPCo	Otter Tail Power Company
PLOTS	Private Land Open to Sportsmen
PPA	Power purchase agreement
PTC	Production tax credit
RD	Rotor diameter
REC	Recognized Environmental Conditions
Road Agreement	Road Use and Maintenance Agreement
SCADA	Supervisory Control and Data Acquisition
SHPO	North Dakota’s State Historic Preservation Office

Siting Act	The North Dakota Energy Conversion and Transmission Facility Siting Act
SoDaR	Sound Detection and Ranging
SPCC	Spill Prevention, Control, and Containment Plan
SWPPP	Storm Water Pollution Prevention Plan
the Project	The Courtenay Wind Farm Project
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
WAPA	Western Area Power Administration
WCFZs	Worst Case Fresnel Zones
Westwood	Westwood Professional Services
WMAs	Wildlife Management Areas
WPAs	Waterfowl Production Areas

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1.0 Introduction

Courtenay Wind Farm, LLC (CWF), a subsidiary of Geronimo Wind Energy, LLC d/b/a Geronimo Energy (Geronimo), respectfully submits this application to the North Dakota Public Service Commission (Commission) for a Certificate of Site Compatibility (Certificate) for the Courtenay Wind Farm Project (the Project). Courtenay filed a Letter of Intent regarding this application with the Commission on February 01, 2013. The Project has been assigned case number PU-13-64.

The Project will be located in Stutsman County, North Dakota (Figure 1). The Project's capacity will be up to 200.5 megawatts (MW) of wind energy. The Project plans to interconnect to the existing electrical transmission system at Otter Tail Power Company's (OTPCo) 115/345 kilovolt (kV) Jamestown Substation seven miles north of Jamestown, North Dakota. A 115 kV generator lead line will be constructed to facilitate the Project's interconnection. In accordance with Section 49-22-03(12)(a) of the North Dakota Century Code, the proposed generator lead line falls outside of the Commission's siting jurisdiction. Consequently, the generator lead line will be permitted through Stutsman County and any applicable townships, as necessary. For this reason, the generator lead line is not discussed in detail in this application.

CWF's majority owner, Geronimo, is a utility-scale renewable energy developer based in Edina, Minnesota. Geronimo has developed three operating wind energy projects in southern Minnesota. Geronimo's 200 MW Prairie Rose Project in Rock County, Minnesota was placed in service in December 2012. Additionally, a local landowner investment group, Courtenay Wind Farmers, LLC, is an equity partner in the Project.

1.1 Compliance with the Energy Conversion and Transmission Facility Siting Act, NDCC Chapter 49-22

The North Dakota Energy Conversion and Transmission Facility Siting Act (Siting Act), NDCC Chapter 49-22, requires a utility proposing to construct, own and operate an energy conversion facility in the state of North Dakota to obtain a Certificate from the Commission. The Siting Act specifies that the siting of an energy conversion facility is to be made "in an orderly manner compatible with environmental preservation and the efficient use of resources" (NDCC 49-22-02). An application for a Certificate must meet certain criteria set forth in the Siting Act, as well as in the Commission's Siting Rules (see Article 69-06 of the North Dakota Administrative Code (NDAC)).

In this application, CWF presents the information required by the Siting Act and the Commission's Siting Rules. CWF discusses its consideration of the exclusion areas, avoidance areas, selection criteria, and policy criteria set forth in Section 69-06-08-01 of the NDAC, as well

as the factors set forth in NDCC Section 49-22-09. The Project's anticipated design and technical information are also provided herein. Tables 1.1-1, 1.1-2, and 1.1-3 outline the information required to fulfill the requirements for an application for a Certificate.

Table 1.1-1 Certificate Completion Checklist

Application Requirement per Chapter 69-06-04 for a Certificate of Site Compatibility	**Description of Application Requirement per Chapter 69-06-04 for a Certificate of Site Compatibility**	**Section in CWF's Application**
1. Form		
	An application must be reproduced and bound to 8 ½ by 11 inch size. Accompanying maps must be folded to 8 ½ by 11 inches with the title block appearing in the lower right-hand corner.	All Sections
2. Contents. The application must contain		
Section A	A Description of:	
1.	The type of energy conversion facility proposed	1.2; 4.1; 4.2; Figures 7, 8, 9
2.	The gross design capacity	1.2
3.	The net design capacity	1.2
4.	The estimated thermal efficiency of the energy conversion process and the assumptions upon which the estimated is based	N/A
5.	The number of acres that the proposed facility will occupy, and	1.2; 5.1
6a.	The anticipated time schedule for obtaining the certificate of site compatibility.	1.3
6b.	The anticipated time schedule for completing land acquisition	1.3
6c.	The anticipated time schedule for starting construction	1.3
6d.	The anticipated time schedule for completing construction	1.3
6e.	The anticipated time schedule for testing operations	1.3
6f.	The anticipated time schedule for commencing commercial production	1.3
6g.	The anticipated time schedule for beginning any expansions or additions	1.3

Application Requirement per Chapter 69-06-04 for a Certificate of Site Compatibility	Description of Application Requirement per Chapter 69-06-04 for a Certificate of Site Compatibility	Section in CWF's Application
Section B	Copies of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state, or local agency	Appendices C & F
Section C	An analysis of the need for the proposed facility based on present and projected demand for the product or products to be produced by the proposed facility, including the most recent system studies supporting the analysis of the need	2.1
Section D	A description of any feasible alternative methods of serving the need.	2.2
Section E	A study area that includes the proposed facility site, of sufficient size to enable the Commission to evaluate the factors addressed in North Dakota Century Code section 49-22-09.	5.1, Figure 1, Figure 19
Section F	A discussion of the utility's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives.	Appendix A
Section G	A map identifying the criteria that provides the basis for the specific location of the proposed facility within the study area.	Figures 1, 2, 3, 19
Section H	A discussion of the criteria evaluated within the study area, including exclusion areas, avoidance areas, selection criteria, policy criteria, design and construction limitations, and economic considerations.	3.0-3.6
Section I	A discussion of the mitigative measures that the applicant will take to minimize adverse impacts which results from the location, construction, and operation of the proposed facility	7.2-7.18
Section J	The qualifications of each person involved in the facility site location study.	11.0

Application Requirement per Chapter 69-06-04 for a Certificate of Site Compatibility	Description of Application Requirement per Chapter 69-06-04 for a Certificate of Site Compatibility	Section in CWF's Application
Section K	A map of the study area showing the location of the proposed facility and the criteria evaluated.	Figures 4-6 & 10-19
Section L	An 8 ½ inch by 11 inch black and white map suitable for newspaper publication depicting the site area.	Figure 20
Section M	A discussion of present and future natural resource development in the area	7.0 and 10.8
Section N	Map and GIS requirements. The applicant shall provide information that is complete, current, presented clearly and concisely, and supported by appropriate references to technical and other written material available to the Commission.*	Figures 1-6 & 10-13 & CD-R

*Data must be submitted in the ESRI shapefile or geodatabase format. If the applicant cannot submit the data in the ESRI format, an alternate format may be submitted with written approval by Commission staff. Data must include appropriate attribute data for the included features. Relevant and complete metadata in compliance with FGDC metadata standards must be provided with all files. Supporting documents such as base maps, figures, cross-sections and reports must be submitted in the Portable Document File (DPF). If the supporting documents were derived from GIS/Cad files the supporting GIS/Cad files must also be included in the submittal. Aerial photos (raster images) must be georeferenced and submitted in TIFF, GEOTIFF, or MrSID image file formats with the associated world files. Appropriate metadata must be provided with all files, such as the source for the raster images, dates of aerial photography and the type of the imagery, color bands i.e., black & white, color, color infra-red and any other pertinent data. All GIS base map data must be referenced to a published geographic or projected coordinate system. The appropriate systems would be North Dakota coordinate system of 1983, North and/or South zones US Survey feet (NAD 83), UTM Zone 13N or 14N meters (NAD 83), or Geographic coordinate system (WGS 84) meters. The vertical datum must be the North American Vertical Datum of 1988. Tabular data (i.e. laboratory analytical data, water level elevation data, monitor well construction data, well and boring X and Y location data, grain size analysis data, hydraulic conductivity data, etc.) must be submitted in either a Microsoft Excel or Microsoft Access database format or both if both are used. Textural data may be submitted in Microsoft Word or PDF format. The application may be submitted to the Commission on the following media: Compact Disc (CD – ROM (CD-R)), Digital Versatile Disc (DVD-R or DVD+R) or other media upon Commission approval.

Table 1.1-2 Certificate Completion Checklist Continued

Application Requirement per Section 49-22-08 for a Certificate of Site Compatibility	Description of Application Requirement per Section 49-22-08 for a Certificate of Site Compatibility	Section in CWF's Application
1. An application for a certificate shall be in such form as the commission may prescribe, containing the following information:		
a.	A description of the size and type of facility.	1.2

Application Requirement per Section 49-22-08 for a Certificate of Site Compatibility	Description of Application Requirement per Section 49-22-08 for a Certificate of Site Compatibility	Section in CWF's Application
b.	A summary of any studies which have been made of the environmental impact of the facility.	7.7; 7.11-7.18
c.	A statement explaining the need for the facility.	2.1-2.3
d.	An identification of the location of the preferred site for any energy conversion facility.	1.2; Figures 1-3
e.	An identification of the location of the preferred corridor for any transmission facility.	N/A
f.	A description of the merits and detriments of any location identified and a comprehensive analysis with supporting data showing the reasons why the preferred location is best suited for the facility	1.1-3.6; 5.1-5.2; 7.1-7.18
g.	A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility.	7.1-7.18
h.	An evaluation of the proposed site or corridor with regard to the applicable considerations set out in section 49-22-09 and the criteria established pursuant to section 49-22-05.1.	3.1-3.6; 10.1-10.11
i.	Such other information as the applicant may consider relevant or the commission may require.	Full Application including Appendices and Figures

Table 1.1-3 Certificate Completion Checklist Continued

Application Requirement per Section 49-22-09 for a Certificate of Site Compatibility	Description of Application Requirement per Section 49-22-09 for a Certificate of Site Compatibility	Section in CWF's Application
The commission shall be guided by, but is not limited to, the following considerations, where applicable, to aid the evaluation and designation of sites, corridors, and routes:		

Application Requirement per Section 49-22-09 for a Certificate of Site Compatibility	Description of Application Requirement per Section 49-22-09 for a Certificate of Site Compatibility	Section in CWF's Application
1.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	10.1
2.	The effects of new energy conversion and transmission technologies and systems designed to minimize adverse environmental effects.	10.2
3.	The potential for beneficial uses of waste energy from a proposed energy conversion facility.	10.3
4.	Adverse direct and indirect environmental effects which cannot be avoided should the proposed site or route be designated.	10.4
5.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.	10.5
6.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	10.6
7.	The direct and indirect economic impacts of the proposed facility.	10.7
8.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	10.8
9.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	10.9
10.	The effect of the proposed site or route on areas which are unique because of biological wealth or because they are habitats for rare and endangered species.	10.10
11.	Problems raised by federal agencies, other state agencies, and local entities.	10.11

1.2 Project Summary

The Project will be located north of the city of Jamestown and southwest of the city of Courtenay in northeastern Stutsman County, North Dakota (Figures 1, 2, 3). The planned output for the Project is up to 200.5 MW of wind energy capacity. CWF continues to assess its turbine options, but anticipates that it will utilize a turbine model with an output of between 1.5 MW and 3.0 MW. The Project Area contains approximately 24,200 acres and CWF currently leases approximately 19,000 privately-owned acres for the Project.
The Project's facilities will include:

- Wind turbines and related equipment;
- New gravel access roads and improvements to existing roads;
- Underground electrical collection lines;
- Operations and maintenance (O&M) building;
- Project substation facility;
- Up to four permanent meteorological towers (up to 80 m tall);
- A temporary batch plant area and staging/laydown area for construction of the Project.

1.2.1 Project Area

The Project Area is composed of private land parcels subject to easement agreements between CWF and Stutsman County landowners. CWF selected the specific Project Area based on significant landowner interest, transmission and interconnection suitability, optimal wind resource, and minimal impact on environmental resources (see Section 2.3). Table 1 lists the townships, sections, and ranges (all in Stutsman County) that are included in the Project Area.

Table 1.2-1: Project Location

Township Name	Township	Range	Sections
Gray	142 N	62 W	4, 5, 6, 7, 8, 17
Ashland	142 N	63 W	1, 2, 3, 4, 11, 12, 14
Courtenay	143 N	62 W	6, 7, 8, 17, 18, 19, 20, 21, 28, 29, 30, 21, 32, 33
Durham	143 N	63 W	1, 2, 3, 9, 10, 11, 12, 13, 14, 15, 22, 13, 24, 25, 26, 35, 36
Nogosek	144 N	63 W	26, 27, 34, 35, 36

As noted in Section 1.0, the Project Area covers approximately 24,200 acres. However, the Project's above ground facilities will occupy less than one percent of that area.

1.2.2 Project Layout

In this application, CWF is providing a preliminary Project layout (Figure 4). This preliminary layout assumes the lowest MW turbine, which results in the largest quantity of turbines. A final Project layout will be provided to the Commission prior to the public hearing regarding this application for a Certificate.

CWF's turbine layout will optimize electrical generation and efficiency for the Project's wind resource while minimizing and avoiding environmental, cultural, and economic impacts. The Project's turbines and ancillary facilities will be sited so as to comply with the Commission's and the county's setback requirements, as well as other voluntarily-imposed setbacks. CWF will coordinate with landowners and applicable agencies regarding the Project's final design and layout.

Following the issuance of a Certificate by the Commission, CWF will hold a pre-construction meeting with the Commission staff. The pre-construction meeting offers an opportunity to review the site plan and confirm the plan's compatibility with the Certificate's requirements.

After the Project is built, CWF will file as-built surveys with the Commission, Stutsman County, and other agencies that request them.

1.2.3 Projected Output

The Project will have a nameplate (gross) generating capacity of up to 200.5 MW, with projected average annual output of up to 825,546 megawatt hours (MWh). This projected average annual output assumes a net capacity factor between 43 and 47 percent. The net capacity delivered to the electrical transmission system on an annual basis will be approximately 809,035 MWh. A typical capacity factor for wind energy projects in the Great Plains region is approximately 35 to 45 percent. CWF anticipates that this project will have a capacity factor that is greater than those typical of the Great Plains. CWF recognizes that actual Project output will be determined by the wind resource, final design, and equipment selection and will vary on an inter-annual basis.

1.3 Project Schedule

The anticipated schedule for land acquisition, Certificate receipt, construction, testing, and commercial operation is outlined below:

- Land acquisition: Completion in second quarter 2013.
- Receipt of Certificate: CWF anticipates the Certificate will be issued by September 2013.
- Construction: CWF anticipates that construction will begin in third quarter 2013 and will be completed in fourth quarter 2014.
- Testing: Testing for the Project is expected to begin in fourth quarter 2014, following the completion of construction.
- Commercial Operation Date: Commercial operation for the Project is scheduled to begin in fourth quarter 2014, following the completion of construction and testing.

Currently there are no plans for expansions or additions to the Project.

1.4 Project Ownership

The Project will be constructed, owned, and operated by CWF. CWF is a privately-owned independent power producer (IPP). Geronimo is its majority owner. Geronimo is a privately held renewable energy developer with headquarters in Edina, Minnesota and regional offices in Fargo and Jamestown, North Dakota. CWF's minority owner is Courtenay Wind Farmers, LLC, an independently governed North Dakota company that was formed to allow landowners to invest in the Project.

2.0 Need for Facility

2.1 Need Analysis

In 2007, North Dakota enacted a state renewable and recycled energy objective (NDCCh 49-02-28) that ten percent (10%) of electricity sold at retail within the state be obtained from renewable and recycled energy sources by 2015. The objective must be measured by qualifying megawatt-hours (MWh) delivered at retail, or by certificates representing credits purchased and retired to offset non-qualifying retail sales. Wind energy falls within the definition of "renewable electricity and recycled energy" as defined by the North Dakota Legislature. Also in 2007, the North Dakota Legislature enacted a statutory provision adopting the national "25x25" initiative, which establishes a goal of having not less than twenty-five percent (25%) of the total energy consumed within the United States come from renewable resources by January 1, 2025.[1]

In addition, a regional need exists for renewable energy produced in North Dakota. Eleven of the MISO states currently have renewable portfolio standards. MISO estimates that an additional nearly 48 million MWh of renewables will need to be added by 2021 and approximately 55 million MWh will be needed by 2026 to meet the collective requirements of these standards (MISO 2012).

Table 2.1-1 details the existing wind energy capacities of North Dakota and surrounding states.

Table 2.1-1: Wind Generating Capacity for North Dakota and Surrounding States as of January 1, 2013

State	Installed MW
North Dakota	1679
Minnesota	2986
Montana	645
South Dakota	784

Minnesota in particular has a significant renewable energy standard. Xcel Energy, which operates in North Dakota and Minnesota (and other states), has an active solicitation for 200 MW of wind energy at the time of this filing. Minnesota Power also has an active 200 MW wind energy solicitation. OTPCo, another investor-owned utility that operates in Minnesota and North Dakota, expects to acquire another 50 MW of wind energy by 2013.

Overall, Geronimo estimates that Minnesota's utilities will need to acquire in excess of 1,400 MW of wind by 2020 to comply with the state's renewable energy standards. With significant

[1] *See* N.D.C.C. § 17-01-01

new transmission construction in the area and the Project's superior wind resource, we expect that CWF will provide a highly competitive option to utilities seeking to fulfill their renewable energy standards. Additionally, large non-utility businesses have been purchasing renewable energy for their own use (Google 2011). Thus, the Project may also help a corporation reach its environmental and sustainability goals.

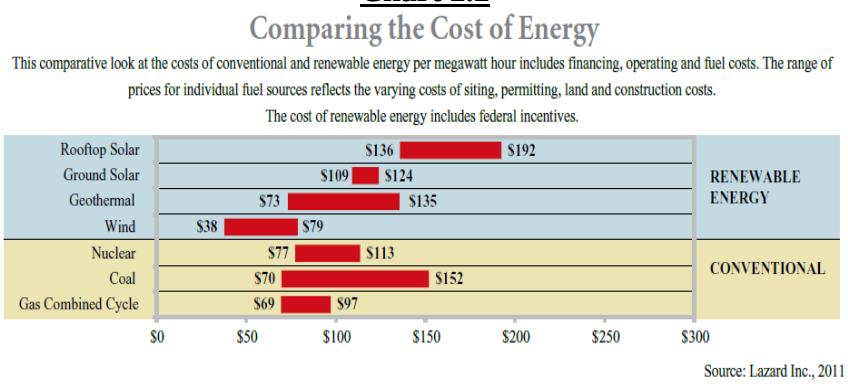
Overall, the Project is consistent with North Dakota's commitment to growing the renewable energy portfolio of both the state and the country, and will help meet the significant regional need for renewable energy. CWF may help meet North Dakota's renewable and recycled energy objective, or renewable energy standards in another state, by adding up to 200.5 MW of renewable electricity generating capacity. However, the need for the Project and CWF's ability to complete the Project is ultimately determined by the market's demand for long-term energy contracts. Utilities seeking to diversify and build their energy generation portfolios are attracted to wind energy projects because of long-term competitive pricing, environmental benefits, and existing and potential (state and federal) renewable energy policies.

The specific off-taker for the Project has not yet been identified. Potential off-takers for the Project include Midwest Independent System Operator (MISO) and Western Area Power Administration (WAPA) utilities, or utilities in service territories adjacent to MISO or WAPA.

2.2 Alternatives That May Also Serve this Need

Potential purchasers of the Project's output will likely consider other forms of renewable electrical generation, including: solar energy, biomass energy, and hydropower generation. Wind energy is currently the most cost effective renewable resource. In many cases it is cost competitive with long-term estimates of natural gas-fired electric generation. Chart 2.2 below shows the results of a 2011 Lazard, Inc. study comparing the annual cost/MWh of various forms of renewable and conventional electric generation.

Chart 2.2



A 2012 draft report prepared by the Eastern Interconnection Planning Collaborative and sponsored by the U.S. Department of Energy modeled the potential role that various generation

types (renewable and non-renewable) may play in the eastern interconnect, which would include CWF. In the three modeled scenarios, wind energy led all renewable energy generation types in terms of interconnection ability and potential generation capacity. The research indicates that wind energy is the most viable source of renewable energy in the eastern interconnect (Eastern Interconnection Planning Collaborative 2012).

In addition to the cost-effectiveness of wind energy shown above, the size, type and timing of the Project make it unlikely that alternative renewable energy sources would meet the same need. A 200.5 MW ground-based solar energy project would take a large, continuous block of farmland out of agricultural production. The necessary hydrological profile for a 200.5 MW hydropower project is not available in the Project Area. In addition, there is not a steady, sustainable fuel source for a 200.5 MW biomass plant.

2.3 Ten-Year Plan

CWF will file a Ten-Year Plan with the Commission and the Auditor's Office of Stutsman County on or before July 1, 2013. The Ten-Year Plan will be consistent with this application for a Certificate.

3.0 Site Selection Criteria

CWF selected the site for the Project after completing a thorough analysis of the Project's economic, technical, and environmental characteristics. Before finalizing the selection of the site, CWF reviewed various regional site options and specific site layouts. CWF considered potential wind energy project sites throughout North Dakota and the neighboring states. The CWF site selection process considered the following criteria:

- **Wind Resource Quality:** As Section 1.2 notes, the wind resource at the Project is significantly better than an average site in the upper Great Plains, making the Project very competitive on a regional basis.
- **Landowner and Community Interest:** Geronimo prides itself on developing wind farms that are farmer-friendly, community driven and beneficial for rural communities. CWF is a solid example of this approach. CWF started when a group of local landowners identified wind energy as the best method for maximizing and diversifying their land assets. After interviewing several wind energy development companies, the landowner group selected Geronimo as its development partner in 2008. The initial group of landowners is still very active with the Project. As discussed in Section 1.4, a partnership formed between a local landowner limited liability company and Geronimo to allow for optional local ownership in the development of the Project. In addition to the optional landowner investment group, Geronimo will also launch the Courtenay Community Fund upon the Project's commercial operation. The Courtenay Community Fund, a 501(c)(3) organization, is advised by a local board nominated by landowners. Its purpose is engaging in, assisting with, and contributing money to exclusively charitable activities and opportunities within the communities of North Dakota connected to the Project. Geronimo also maintains regional offices in Fargo and Jamestown, North Dakota.
- **Transmission Suitability:** The Project's inter**c**onnection feasibility and transmission suitability initially drew CWF to the Project Area. The Project is situated to allow the economical delivery of power to the electrical transmission system.
- **Environmental and Cultural Considerations:** Before selecting the Project Area, CWF assessed multiple sites in the region from environmental and cultural perspectives. CWF used a variety of tools to compare potential project sites, including but not limited to the USFWS Land Based Wind Energy Guidelines (LBWEGs). CWF selected the Project Area in part because it offered a relatively low impact to environmental and cultural resources.
- **Economics of the Project:** The high quality wind resource discussed above directly affects the economics of the Project. The Project is a competitive, cost-effective energy project. The economics of the Project are discussed in depth in Section 3.6.

After considering the criteria above and finding the Project to be cost-effective, environmentally responsible and technically feasible, Geronimo communicated with landowners about the

possibility of a wind energy project in their community, and organized CWF. CWF then entered into lease agreements with interested landowners. Once the site was selected and secured, CWF identified preliminary turbine locations based on wind resource analysis, efficient design, initial site inspection, topography, known environmentally-sensitive areas, and communications with local, state and federal agencies. CWF will review preliminary turbine locations with landowners in a siting workshop planned for spring 2013.

CWF also reviewed the criteria in Section 69-06-08-01 of the NDAC and factored these criteria into the Project and site design. These criteria are discussed further below.

3.1 Exclusion Areas

The geographical areas identified in Section 69-06-08-01(1) of the NDAC "must be excluded in the consideration of a site for an energy conversion facility" (see Table 3.1-1). Section 69-06-08-01(2) of the NDAC also lists geographic areas that, "must be excluded in the consideration of a site for a wind energy conversion facility" (see Table 3.1-2). All exclusion areas are mapped on Figure 5.

Table 3.1-1 Exclusion Areas for Energy Conversion Facilities

Exclusion Area	Present within Project Area?	Description	Section Addressed
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	None	None of the listed lands occur within the project area. Six waterfowl production areas are located within the project's study area.	7.7; 7.8; 7.3
Designated or registered state: parks; forests; forest management lands; historic sites; monuments; historical markers; archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves.	None	N/A	7.7; 7.8; 7.3

Exclusion Area	Present within Project Area?	Description	Section Addressed
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	None	N/A	7.8; 7.10; 7.3
Prime farmland and unique farmland, as defined by the land inventory and monitoring division of the soil conservation service, United States Department of Agriculture (USDA), in 7 C.F.R. Part 657; provided, however, that if the Commission finds that the prime farmland and unique farmland that will be removed from use for the life of the facility is of such small acreage as to be of negligible impact on agricultural productions, this exclusion does not apply.	Yes, a total of 10,453 acres of prime farmland, 653 acres of prime farmland if drained, and 2,580 acres of farmland of statewide importance.	The Project proposes to impact less than 1% of the total land that could be considered prime farmland or farmland of statewide importance. Therefore, CWF requests that the Commission determine that a prime farmland exclusion shall not apply to the Project.	7.10 & Figure 14
Irrigated land.	None	N/A	3.3
Areas critical to the life stages of threatened or endangered animal or plant species.	None	N/A	7.16; 7.17; 10.10
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	None	N/A	10.10; 7.17
Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility.	None	N/A	4.2

Table 3.1-2 Additional Exclusion Areas for Wind Energy Conversion Facilities

Additional Exclusion Area	Present within Project Area?	Description	Section Addressed
Areas less than one and one-tenth times the height of the turbine from interstate or state roadway right-of-way	None	N/A	4.2; 7.4; Figure 5
Areas less than one and one-tenth times the height of the turbine plus seventy-five feet from the centerline of any county or maintained township roadway	Yes	No turbines will be sited within this exclusion area.	4.2; Figure 5
Areas less than one and one-tenth times the height of the turbine from any railroad right-of-way	Yes	No turbines will be sited within this exclusion area.	4.2; Figure 5
Areas less than one and one-tenth times the height of the turbine from a one hundred fifteen kilovolt or higher transmission line	None	N/A	4.2; 7.4
Areas less than one and one-tenth times the height of the turbine* from the property line of a non-participating landowner**	Yes	No turbines will be sited within this exclusion area, unless a variance is granted.	4.2; Figure 5

* Stutsman County has a setback of two times the rotor diameter from the property line of a non-participating landowner. CWF will adopt whichever setback is greater.
**Unless a variance is granted. A variance may be granted if an authorized representative or agent of the permittee and affected parties with associated wind rights file a written agreement expressing all parties' support for a variance to reduce the setback requirement in this subsection. A non-participating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in NDCC Chapter 17-04.

3.2 Avoidance Areas

Per Section 69-06-08-01(3) of the NDAC, "The following geographical areas may not be approved as a site for an energy conversion facility unless the applicant shows that under the circumstances there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility the commission may consider, among other things, the proposed management of adverse impacts; the orderly siting of facilities; system reliability and integrity; the efficient use of resources; and alternative sites. Economic considerations alone will not justify approval of these areas. A buffer zone of a reasonable width to protect the integrity of the area must be included. Natural screening may be considered in determining the width of the

buffer zone." See Table 3.2-1 for a discussion of the criteria outlined in Section 69-06-08-01(2). See Table 3.2-2 for a discussion of the additional avoidance areas for wind energy conversion facilities set forth 69-06-08-01(4) of the NDAC. Avoidance areas are mapped on Figure 6.

Table 3.2-1 Avoidance Areas for Energy Conversion Facilities

Avoidance Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
Historical resources which are not designated as exclusion areas.	Two historic structures were identified within the Study Area, but no historical resources were identified within the Project Area.	The two historic structures were identified in a Class I literature search. A Class II architectural survey and a Class III pedestrian survey will also be conducted. Any historical or cultural resources identified will be avoided.	7.7; Figure 6
Areas within the city limits of a city or the boundaries of a military installation.	Yes. A small portion of undeveloped land of the City of Courtenay lies within the Project Area.	No Project facilities will be located within the City of Courtenay.	7.3; Figure 6
Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood.	The Project is located entirely in Zone X of the FEMA floodplain maps for the region. The Zone X designation indicates that the Project area is of minimal flood hazard.	None	7.13; 7.14; 7.18
Areas that are geologically unstable.	None	N/A	7.12; 7.18

Avoidance Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
Woodlands and wetlands.	Yes. The Project is located within the Prairie Pothole region of North Dakota and has a number of small kettle lakes. The area is scattered with small groves of trees and shelter belts that have been planted by the settlers and current residents of the area.	The Project will utilize a setback from wetlands that is sufficient to appropriately manage storm water runoff and minimize disturbances. Tree groves in the Project Area are largely associated with rural home sites. The Project will utilize a 1,400' setback from homes, which will avoid or minimize impacts to trees. If impacts to trees occur, CWF will follow the Commission's tree and shrub mitigation specifications. The Project will minimize impacts to wetlands to the extent possible and will follow all U.S. Army Corps of Engineers (USACE)	7.10; 7.14; 7.16; 7.18; Figures 6, 15, 17

Avoidance Area	Present within Project Area?	Description and Proposed Buffer	Section Addressed
		regulations regarding any jurisdictional wetlands.	
Areas of recreational significance which are not designated as exclusion areas.	None	N/A	7.8

Table 3.2-2 Additional Avoidance Areas for Wind Energy Conversion Facilities

Additional Avoidance Area	Present within Project Area?	Description	Section Addressed
A geographic area where, due to operation of the facility, the sound levels within 100 feet of an inhabited residence or a community building will exceed 50 dBA.*	Yes	CWF will utilize a 1,400' setback from occupied residences, so as to avoid such areas. If there were an instance in which sound levels exceeded recommended levels, CWF would seek a waiver.	7.6; 4.2

*The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.

3.3 Selection Criteria

Per Section 69-06-08-01(5) of the NDAC, "[a] site may be approved in an area only when it is demonstrated to the Commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area, as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum. Table 3.3-1 provides a summary of the selection criteria.

Table 3.3-1 Selection Criteria

Selection Criteria	Potential Adverse Effects	Section Addressed
The impact upon agriculture:		
Agricultural production	The Project will not result in a significant loss of agricultural production. Out of approximately 24,200 acres in the Project Area, approximately five hundred sixty acres (2.0%) will be impacted temporarily, and approximately fifty acres (0.2%) will be impacted permanently.	7.3; 7.10
Family farms and ranches	CWF is committed to designing the Project to avoid adverse impacts to family farms and ranches. Landowners who participate in the Project receive compensation that provides a positive financial impact.	7.2; 7.3
Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	Landowners have not expressed concerns related to irrigation on their property. No known irrigation is present in the Project Area.	N/A
Surface drainage patterns and ground water flow patterns	None	7.10; 7.11; 7.12; 7.13; 7.14; 7.15
The agricultural quality of the cropland	Soil compaction is anticipated, however decompaction services or financial reimbursement will compensate for any soil compaction that does occur.	7.10
The impact upon the availability and adequacy of:		
Law enforcement	None	7.4
School systems and education programs	School districts will receive approximately $457,000-$475,000 per year in tax revenue (assuming a 200.5 MW wind energy project).	3.6
Governmental services and facilities	None. The Project will coordinate with local and state units of government to prevent interruption or degradation of services during construction and operation.	7.2; 7.4; 8.0; 10.7
General and mental health care facilities	None	7.4

Selection Criteria	Potential Adverse Effects	Section Addressed
Recreational programs and facilities	None	7.8
Transportation facilities and networks	During construction, the Project Area will see a temporary increase in use of the existing public transportation facilities and networks. Once the Project is operational, no adverse impacts on the availability and adequacy of these resources are anticipated. CWF will enter into a Road Use and Maintenance Agreement (road agreement) with Stutsman County and the townships, as applicable, to ensure that, following the completion of construction, roads are returned to as good or better condition as they were in pre-construction.	7.4
Retail service facilities	Contractors' spending is expected to positively affect local retail service facilities, including gas stations, grocery stores, cafes, hotels, and entertainment venues.	2.0; 3.6; 7.2
Utility services	No adverse impacts on the availability and adequacy of existing utility services are anticipated. The Project will complete an interconnection process with MISO, and OTPCo and any other affected utilities to ensure the continuity of utility services and to interconnect the Project in accordance with the Federal Energy Regulatory Commission (FERC), North American Electric Reliability Corporation (NERC), MISO, and OTPCo standards. North Dakota One-Call will be used to locate existing utilities prior to construction.	7.4
The impact upon:		
Local institutions	Local institutions that qualify for the receipt of tax revenue generated from the Project will be positively impacted.	3.6; 10.8

Selection Criteria	Potential Adverse Effects	Section Addressed
Noise-sensitive land uses	The construction of the Project may cause temporary noise impacts. CWF will mitigate construction noise levels by minimizing night-time construction activities. Longer term potential impacts will be avoided through proper setbacks.	3.6; 7.6
Rural residences and businesses	No adverse impacts on existing rural residences and businesses are anticipated. Turbines will be setback at least 1,400 feet from occupied residences.	3.6; 7.2; 7.3; 7.8; 7.9
Aquifers	Impacts to groundwater resources, including aquifers, are not anticipated as water supply needs will be quite limited. It is probable that operations and maintenance water requirements will be satisfied with a single domestic-sized water well.	7.12
Human health and safety	CWF will set back wind turbines from all occupied residences, bury collection lines to a depth of approximately 3 ft, and fence off and place warning signs around the Project substation. CWF will consult with North Dakota One Call and local first responders. Any petroleum waste will be handled and disposed of in accordance with local, state, and federal regulations. Security measures will be taken to reduce the chance of physical and property damage, as well as personal injury. The project batch plant will comply with all federal and state air quality standards. CWF will take all necessary measures to minimize fugitive dust emissions.	7.5
Animal health and safety	CWF is completing scientific studies to understand the wildlife profile in and nearby the Project Area. CWF will minimize or mitigate for any anticipated impacts regarding wildlife and biological resources.	7.16; 7.17

Selection Criteria	Potential Adverse Effects	Section Addressed
Plant life	The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. The amount of vegetation that will be permanently removed as a result of the Project will be determined once a site layout is finalized. CWF will avoid impacts to biologically rare and sensitive areas, including native prairie.	7.14; 7.15; 7.17
Temporary and permanent housing	The Project may utilize temporary housing during construction. During operation, there is unlikely to be an adverse effect on temporary and permanent housing due to the small number of O&M employees required. It is likely that O&M employees will live near the Project and create a positive effect on the housing market by renting or purchasing then-available housing.	7.2
Temporary and permanent skilled and unskilled labor	No adverse effects to temporary and permanent skilled and unskilled labor are anticipated. Project construction and operations should yield a benefit to the labor community, both short- and long-term.	7.2
Cumulative impact:		
The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development.	No adverse cumulative effects due to the location of the Project in relation to existing or planned facilities and other industrial developments are anticipated.	7.4; 7.18

3.4 Policy Criteria

In accordance with Section 69-06-08-01(6) of the NDAC, "The Commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies and practices, and in a proper case may require the adoption of such policies and practices. The commission may also give preference to an applicant that will maximize interstate benefits." These policy criteria are addressed below in Table 3.4-1.

Table 3.4-1

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Recycling of the conversion byproducts and effluents	N/A	N/A
Energy conservation through location, process, and design	CWF will design the project to maximize wind resource in the area while minimizing electrical losses. The underground collection system cables will be sized to reduce lost electricity and the substation location will be located to minimize the use of low voltage, higher loss cables.	4.1; 4.2; 6.1; 6.2; 6.3
Training and utilization of available labor in this state for the general and specialized skills required	CWF will utilize local labor to the extent practicable during development of the Project.	7.2
Use of a primary energy source or raw material located within the state	Wind the primary energy source for the Project, is a plentiful and renewable energy source within North Dakota. The Project also expects to use local gravel and/or aggregate resources during construction. The closest gravel pit is approximately four miles south of the Project.	7.3

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Not relocating residents	There will be no displacement of residences in the development, construction or operation of the Project.	7.3
The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management	CWF may dedicate an adjacent area for land uses such as recreation, agriculture, or wildlife management. The dedication of an area could foreseeably provide a mitigative biological measure or a charitable contribution to the community through the Courtenay Community Fund.	7.18

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Economies of construction and operation	As an up to 200.5 MW wind energy project, CWF will benefit from economies of scale related to the Project's construction and operation. Wind energy projects have one-time costs that remain relatively stable despite the scale of the project. Therefore, a larger project will have cost advantages in comparison to a smaller project because the fixed costs are spread out over more units of output. Some examples of wind energy project costs that remain similar despite the size of the project include: an on-site office space, crane mobilization, an on-site supervisor, construction of a laydown yard, and substation procurement and construction.	6.4

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife	None are proposed. The Project will be sited on property owned by third parties that is not open to the public.	1.2; 4.4; 7.8; 7.16
Use of citizen coordinating committees	Courtenay Wind Farmers, LLC is a landowner investment group. The investment group includes a landowner-elected board of advisors that coordinates closely with CWF.	1.4; 3.6; 10.7
A commitment of a portion of the energy produced for use in this State	The Project will interconnect with the local utility transmission line and grid. Since CWF does not have an off take agreement at this time there is no geographic commitment to a portion of the energy. From a practical standpoint, the electricity will travel the path of least resistance and much will be consumed in the local area.	1.2; 3.5; 6.1; 6.3

Policy Criteria	Suitable Policy or Practice of Applicant	Section Addressed
Labor relations	The Project shall have an employment policy consistent with industry practices. CWF does not anticipate labor relations issues. Experienced contractors will be on-site at the Project and will oversee labor relations.	6.4; 7.2
The coordination of facilities	Existing facilities and facility corridors were considered in the location of the Project and its associated facilities.	3.5; 6.4; 7.4
Monitoring of impacts	CWF and its construction contractors will provide monitoring of construction activities. During operation CWF will follow the USFWS's LBWEGs to monitor and assess impacts from the Project.	6.5; 7.16; 7.17

3.5 Design and Construction Limitations

Wind energy developers, including CWF, take both general and project-specific design and construction limitations into consideration when selecting a site. Design and construction limitations that apply to all wind projects include: wind resource characteristics, electrical

transmission system interconnection options, land availability, landowner interest, and environmental and cultural constraints.

Wind resource is essential in selecting and designing a project. CWF has continuously assessed the meteorological conditions and the wind resource of the Project since July 2010. This assessment confirmed the existence of an economically viable wind resource. It also helped determine optimal turbine spacing and row alignment for the Project.

Capability for interconnection to the existing electrical transmission system is also a significant factor in Project design. The development of new, extensive transmission facilities is time consuming and costly. CWF designed the Project to maximize the use of existing infrastructure and minimize the need for new transmission lines and upgrades to existing lines. The Project plans to interconnect to the existing electrical transmission system at OTPCo's Jamestown substation, which is approximately seven miles north of Jamestown, North Dakota. CWF will build a 115 kV, seventeen mile long generator lead line to facilitate the Project's interconnection. This line will be routed to use existing utility and other infrastructure corridors wherever possible.

Site control is also critical to the Project. CWF secured voluntary land easement agreements with landowners in order to develop the Project.

Several Project-specific limiting factors are expected to affect the Project's design and construction, including:

- Setback requirements from occupied residences, railroads, property lines and existing roads;
- Avoidance of microwave beam paths;
- Avoidance or mitigation of impacts on archeological sites;
- Turbine spacing requirements;
- Engineering considerations;
- Geotechnical considerations;
- Avoidance and minimization of permanent impacts on wetlands and water bodies;
- Minimization of impacts to native grasslands and critical habitat resources;
- Minimization of impacts to prime agricultural land and other land-based economic resources.

CWF uses design principles that promote locating roads and other above ground facilities near existing linear features so as to reduce impacts to agricultural and habitat resources. Additionally, CWF gathers significant amounts of data to minimize any impacts to drain tile or other underground drainage systems.

3.6 Economic Considerations

As an IPP, CWF's main goal is to provide the lowest cost electricity that the Project can produce. CWF intends to compete in the market for a power purchase agreement (PPA) with a third-party utility or other corporation. To be awarded a PPA, CWF will need to prove the long-term cost effectiveness of the Project's energy. The major cost components of a wind energy facility are:

- Wind resource;
- Transmission availability;
- Equipment costs (including wind turbines);
- Engineering and construction costs;
- Landowner payments;
- Taxes and fees;
- Operations and maintenance costs;
- Off-setting environmental impacts.

CWF's model and the Project offer an opportunity to maximize the economic attributes that benefit the local community and deliver an overall cost-competitive energy project. The Project's strong wind resource (see Section 1.2.3), low transmission upgrades and ability to create a construction-efficient layout are some of the major benefits of the Project.

The American Tax Payer Relief Act of 2012, signed into law on January 2nd 2013, provided for an extension of the Production Tax Credit (PTC) for wind energy facilities under construction in 2013. The PTC is important to the Project's success because it provides a financing incentive to potential Project investment partners.

CWF also values the local economic benefits of the Project. The construction of the Project will initiate significant annual landowner payments, local business revenue due to contractors' local spending, and revenue potential for the local members of Courtenay Wind Farmers, LLC. The Project will also broadly benefit the local communities through CWF's Community Fund (discussed further below) and tax revenue generated by the Project. Once operating, the Project is expected to generate approximately $878,000-$914,000 per year in tax revenue for the local community. Those dollars will be divided between Stutsman County (approx. $325,000-$338,000 per year), the townships (approx. $79,000-$82,000 per year), the school district(s) (approx. $457,000-$475,000 per year) and the fire district(s) (approx. $17,000-$18,000 per year).

Landowner compensation is established by voluntary Land Lease and Wind Easement agreements. All landowners who are participating in the Project will receive compensation, whether or not they receive Project facilities on their land. This payment model provides inclusive, community-based economic benefits.

In addition to the Land Lease and Wind Easement payments, Courtenay Wind Farmers, LLC is providing opportunities for local financial investment in the Project. This investment is optional,

and not required for landowner participation in the Project. This model offers the opportunity to support wind energy in the community and to share in the Project's potential success.

CWF's Community Fund, the Courtenay Community Fund is as a 501(c)(3) organization with a board elected by Project land owners. It provides a direct charitable and economic benefit to the communities neighboring the Project. The Community Fund will receive approximately $40,000 annually for charitable community projects. A Board of Directors (comprised of Project landowners, local government officials, and other volunteer community members) will allocate the annual donation to worthy community projects.

4.0 General Description of the Proposed Facility

4.1 Wind Power Technology

As wind passes over the blades of a wind turbine, it creates lift and causes the rotor to turn. The rotor is connected by a hub and main shaft to a system of gears, which are connected to a generator. Figure 7 shows a representative wind turbine with design features characteristic of the turbine types being considered for this Project.

Depending on the turbine model selected, the Project could install up to 133 turbines to meet full generation capacity (see Section 6.2). The exact turbine model has not yet been determined. The turbine model will be selected to be cost-effective, reliable, and optimize land and wind resources.

The tower is planned to be gray or white and will be between 262 feet (80 meters) and 328 feet (100 meters) tall. Typically the tower is made out of rolled steel, though recent advancements in tower fabrication have included wrapped lattice structures and partial or full cement structures. Each tower will be secured by a concrete foundation. The specific design of a foundation may vary to adapt for local soil characteristics and other geotechnical, structural, and mechanical conditions. A control panel inside the base of each turbine tower houses communication devices and electronic circuitry. Each turbine is equipped with a wind speed and direction sensor that communicates to the turbine control system, which indicates when sufficient winds are present for operation. The turbine features variable-speed control and independent blade pitch to promote aerodynamic efficiency.

The electricity generated by each turbine may be transformed within the generator or brought to a pad-mounted transformer where the voltage is raised (stepped up) to a power collection-line voltage of 34.5kV. The electricity is collected by a system of underground or overhead power collection lines within the Project Area. Power collection lines and communication cables will typically be buried underground, but may be constructed overhead as site specific considerations require. Underground collection lines are designed to be buried at a depth of approximately 3-4 ft.

All-weather, permanent gravel access roads approximately 16 to 18 feet in width will connect wind turbines to the existing county and local road network. At the intersection of the access roads and public roads, the underground communication and collection lines will continue as feeder lines, distributing power to the Project Substation. At the Project Substation, the power will again be stepped up to 115 kV and transmitted via an 115kV interconnection station to OTPCo's existing Jamestown Substation. Project interconnection to the electrical transmission system will adhere to standards detailed in the Interconnection Agreement.

Figure 8 depicts the general path of energy from the Project to energy users.

4.2 Wind Energy Project Layout

The Project's layout follows the energy conversion facility siting criteria outlined in NDAC 69-06-08-01 and Stutsman County Ordinance 2.10 regarding Wind Turbine Zoning. While observing these regulations, CWF is designing the Project to optimize the wind resource and minimize impacts to potentially sensitive infrastructure, and ecological and cultural resources. The interaction among the local topography, the wind resource, and Project design also influences the Project's facilities layout.

Table 4.2-1 identifies Project setbacks as designated by the Commission.
On July 7, 2009, Stutsman County incorporated a wind turbine section into its zoning ordinance (Stutsman County 2009). Table 4.2-2 identifies Project setbacks as designated by Stutsman County.

Table 4.2-1 Setback Distances for the Project as Designated by the Commission

Setback Type	Distance
Interstate or state roadway right of way	1.1 times the height of the turbine
The geographic center of an Intercontinental Ballistic Missile (ICBM) launch or launch control facility	1,200 feet
County or maintained township roadway	1.1 times the height of the turbine plus seventy-five (75) feet from the centerline of the roadway
Railroad right-of-way	1.1 times the height of the turbine
115kV or higher transmission line	1.1 times the height of the turbine
Property line of a non-participating landowner	1.1 times the height of the turbine*
Inhabited residence or a community building	A wind energy conversion site must not include a geographic area where, due to the operation of the facility, the sound levels within 100 feet of an inhabited residence or a community building will exceed 50 dBA.**
Inhabited Residence	1,400 ft

* A variance may be granted if an authorized representative or agent of the permittee and affected parties with associated wind rights file a written agreement expressing all parties' support for a variance to reduce the setback requirement in this subsection. A non-participating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in NDCC Chapter 17-04.
**The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building. CWF will conduct a thorough sound analysis once the final Project turbine layout is determined.

Table 4.2-2 Setback Distances for the Project as Designated by Stutsman County

Setback Type from Project Turbines	Distance
Occupied Structure	5RD
Public Road or bridge; rail line; above ground electrical or communication line; and each antenna, tower, unoccupied structure, or improvement with an estimated value of over twenty five thousand dollars ($25,000).	1.1 times the turbine height
Boundary between the host property and any property that adjoins the host property.* Public roads are excepted from this 2RD setback requirement but have an applicable setback above.	2RD

*Stutsman County Ordinance Section 2.10.12A provides for a variance to a setback if the wind farm leases include specific language. CWF's easements include this language and CWF intends to seek this variance. In the event that Stutsman County does not grant this variance CWF will include a 2RD setback from all property boundaries.

When setback distance requirements vary, CWF intends to use the most stringent requirement for siting the Project's turbines.

4.3 Associated Facilities

In addition to the wind turbines and step-up transformers, the Project also includes necessary facilities that allow for safe and efficient project operation. The Project will include permanent access roads that provide access to the wind turbines. These access roads are typically 16-18 feet wide. The roads allow travel for turbine maintenance crews and will be low-profile to allow farm equipment to cross. In addition to locating access roads for efficient design, CWF also takes into consideration landowners' input on road locations. CWF will minimize the impact of its Project facilities on current and future agricultural and environmental resources.

As discussed in Section 4.1, other facilities associated with the Project's electrical system include pad-mounted transformers at the base of each turbine and a system of underground and/or overhead electrical collection lines and junction boxes. The electricity generated at each turbine is collected by underground power collection lines within the Project Area and delivered to the Project substation. An O&M building will be built on-site. The footprint of the Project substation and O&M building will be approximately ten acres. The Project currently hosts two temporary meteorological towers to measure the wind speed and direction. Once constructed, the Project will have up to four meteorological towers located on site and remote sensing Light Detection and Ranging (LIDaR) units or Sound Detection and Ranging Units (SODaR) throughout the Project's lifetime.

Other temporary facilities will be required for the construction phase of the project, including a concrete batch plant, a laydown area for equipment, intersection improvements to facilitate over-length turning, and a staging area for turbine delivery trucks.

4.4 Land Rights

CWF worked with landowners to secure sufficient Land Lease and Wind Easements for an up to 200.5 MW (nameplate capacity) wind energy project. The Land Lease and Wind Easements include provisions for the location of the Project's components and facilities, including but not limited to wind turbines, access roads, underground and overhead collector and feeder lines.

5.0 Proposed Site

5.1 Identification of Project Area

After analyzing a broader area for wind resource, geographic characteristics, easement availability, landowner interest, environmental resources, transmission availability and economic potential, CWF selected the Project Area identified in this application. CWF selected the specific Project Area because of its available land, proximity to viable interconnection options, and interested local landowners. The Project was also identified as optimal from wind resource, environmental, and economic perspectives. CWF specifically studied the Project Area plus a one mile buffer around the boundary (the Study Area as shown in Figure 1 and Figure 19) to assess the environmental and cultural resources adjacent to the Project.

North Dakota has an excellent wind resource. It is often cited as having the greatest wind resource of any state in the continental United States. The east-central part of North Dakota is no exception. East-central North Dakota is characterized by open terrain which allows for free-flowing wind, and flexibility in turbine siting and project design.

When CWF identified the Project as a particularly valuable potential development, it initiated securing the Project Area with Land Lease and Wind Easements. When much of the Project footprint started to take form, CWF started modeling preliminary turbine locations. The turbine locations were selected based on an on-site inspection, topographic maps, known environmentally-sensitive areas, a review of North Dakota's Siting Act and Siting Rules, and communications with local governmental units. CWF is planning a facility siting workshop for landowners in spring 2013. The siting workshop gives landowners the opportunity to review preliminary turbine locations and offer their comments. CWF will finalize the Project's turbine locations after considering input from landowners.

The land in the Project Area primarily consists of cultivated cropland, with relatively few residences and farmsteads present. Turbines and associated facilities will be located throughout the leased portion of the Project. Table 5.1-1 presents a summary of conservative Project impact assumptions for both temporary impacts (construction footprint) and permanent impacts (operational footprint) based on a minimum and maximum number of preliminary turbine locations (see Section 6.2).

Table 5.1-1. Estimated Project Impacts for Project Facilities

Project Facilities	Temporary Impacts		Permanent Impacts	
	Impact Assumption (Conservative)	Anticipated Range of Impacts (Ac.)	Impact Assumption (Conservative)	Anticipated Range of Impacts(Ac.)
Turbines	This impact includes a crane pad, a rotor assembly area, and space for the construction crew to work.	180-222	Each turbine will be between 23 and 36 feet wide at the base including the gravel pad and potential pad mount transformers (above ground)	.5-3.5 (total for all turbines)
Access Roads	Roads will initially be 34' wide to accommodate transportation of the heavy equipment. Once turbines are constructed the roads will be reduced to 18'-16' in width. Temporary intersection improvements will be needed for over-length loads.	45-56	Access roads will be sited to minimize the disruption to agricultural practices, wetlands, and other sensitive features. This will sometimes result in longer roads than would be needed if a straight line were drawn to access the turbines.	15-64
Staging Area	The staging area will require up to 10 acres and will be a gravel pad with entrances designed for access by over-length trucks.	10	The staging area will be removed as part of the site restoration.	0

Project Facilities	Temporary Impacts		Permanent Impacts	
	Impact Assumption (Conservative)	**Anticipated Range of Impacts (Ac.)**	**Impact Assumption (Conservative)**	**Anticipated Range of Impacts(Ac.)**
Laydown Area	The laydown area will be up to 10 ac. in size to accommodate parking and trailers for construction.	10	The laydown area will be removed as part of the site restoration.	0
Collector Line	The equipment used to install the collection system will need a 23' corridor. It is likely this corridor will be shared by either the temporary road widening or the crane paths.	83-118	The collection system will include above ground junction boxes at various points throughout the collection system. The junction boxes will be approximately 10' by 15'. The rest of the collection system disturbance corridor will be restored as part of site restoration.	>.1

Project Facilities	Temporary Impacts		Permanent Impacts	
	Impact Assumption (Conservative)	**Anticipated Range of Impacts (Ac.)**	**Impact Assumption (Conservative)**	**Anticipated Range of Impacts(Ac.)**
Collector Substation		0	CWF plans to site the Collector Substation adjacent to the O&M Facility. In the event that any portions of the area disturbed during construction are not needed for the final operations, they will be restored.	5-10
Crane Paths	CWF plans for the majority of the crane paths to correspond with the location of the electrical collection system or the wider roads. The crane paths will require a corridor of 45'.	89-127	All crane paths will be restored once construction is complete.	0
O&M Facility		0	CWF plans to site the Collector Substation adjacent to the O&M Facility. In the event that any portions of the area disturbed during construction are not needed for the final operations, they will be restored.	5-10

Project Facilities	Temporary Impacts		Permanent Impacts	
	Impact Assumption (Conservative)	**Anticipated Range of Impacts (Ac.)**	**Impact Assumption (Conservative)**	**Anticipated Range of Impacts(Ac.)**
Concrete Batch Plant	A temporary concrete batch plant will be required to supply the concrete for the turbine and other foundations. The construction crew may use the plant's gravel pad throughout construction for storage of equipment. Once construction is complete the gravel pad will be removed.	5-8	N/A	0
Meteorological Tower	N/A	0	The meteorological towers will only require light duty cranes to install and will be freestanding so have a minimal footprint. Their overall area will be less than .1 acre both during construction and operation.	>.1
Total		422-551		25-88

5.2 Wind Characteristics in Project Area

According to the National Renewable Energy Laboratory's "Wind Powering America," wind resources within the Project's region range from 8 to 9 meters per second (m/s) at 80 m height

(U.S. Department of Energy 2012). CWF has performed an internal wind resource and energy assessment using data collected by met towers installed as early as July 2010. Long-term data was available from the North Dakota Agricultural Weather Network (NDAWN) Jamestown, Streeter, and Tappen stations, the National Weather Service (NWS) Automated Surface Observing Systems (ASOS) network Jamestown station, and two nearby model grid points in the NASA Modern Era Retrospective Analysis for Research and Applications (MERRA) data set. This site-specific wind analysis indicates the Project has a highly suitable wind resource for economical, sustainable, and reliable production of power. CWF also proposes to install up to four permanent meteorological towers to monitor the performance of the wind farm, conform to grid integration requirements, and validate wind turbine power curves.

6.0 Engineering and Operational Design Analysis

6.1 Project Layout and Associated Facilities

A summary of the Project's design information is included in the Design Data Report (Appendix B). The Project will consist of up to 133 wind turbines, depending upon the final turbine type selected (see Table 6.2-1). Improvements to existing roads, construction of new gravel access roads, installation of underground electrical collection lines, construction of an O&M building, erection of up to four 80 m tall permanent meteorological towers, and construction of a step-up substation facility are also part of the Project. A temporary staging and laydown area and batch plant are planned for the construction phase of the Project. The access roads, O&M building, and associated facilities will be sited in a manner that minimizes disturbance on the site, yet provides optimal access to all turbines during operations. Drainage systems, access roads, crane pads, foundations, storage areas, and O&M facilities will be installed as necessary to fully accommodate all aspects of Project construction, operation, and maintenance. Any of these facilities not needed once construction is complete will be removed and the area around them restored to its original conditions to the extent reasonably practicable. The proposed Project plans to interconnect to the existing electrical transmission system at OTPCo's substation north of Jamestown, North Dakota. An up to 115kV generator lead line will be constructed to facilitate the Project's interconnection.

6.2 Description of Wind Turbines

Table 6.2-1 compares three turbine types under consideration for the Project. CWF reserves the right to select alternate turbines representative of the same class of turbine. The wind turbines will operate automatically, self-starting when the wind speed reaches the designed cut-in speed specific to each turbine type under consideration for the Project. Once rated power is achieved, the wind turbine will regulate to maintain the rated power. The wind turbine will shut down once the maximum operational limit is reached and restart automatically once the wind drops below a preset restart wind speed. The standard braking system works through feathering of turbine blades. A mechanical brake that is fitted to the gearbox provides additional safety.

Table 6.2-1. Turbine Type Characteristics for the Project

Turbine Type	Rotor Diameter	Rotor Swept Area	Cut-in Wind Speed	Rated Power	Cut-out Wind Speed	Blade Length	Hub Height	Blade Height (Highest)	Blade Height (Lowest)	Max # of Project Turbines
Goldwind GW-77*	77 meters (252.6 feet)	4656 m2 (50123 ft2)	3.5 m/s (7.3 mi/hr)	1.5 MW	22 m/s (49.2 mi/hr)	38.5 meters (126.3 feet)	85 meters (278.8 feet)	123.5 meters (405.1 feet)	46.5 meters (152.5 feet)	133
Siemens SWT-3.0-113**	113 meters (370.6 feet)	10028 m2 (107948 ft2)	3 m/s (6.7 mi/hr)	3.0 MW	25 m/s (55.9 mi/hr)	56.5 meters (185.3 feet)	79.5 meters (260.7 feet)	136 meters (446.1 feet)	23.0 meters (75.4 feet)	67

Turbine Type	Rotor Diameter	Rotor Swept Area	Cut-in Wind Speed	Rated Power	Cut-out Wind Speed	Blade Length	Hub Height	Blade Height (Highest)	Blade Height (Lowest)	Max # of Project Turbines
GE 1.6-100* **	**100 meters (328 feet)**	**7853 m2 (84593 ft2)**	**3 m/s (6.7 mi/hr)**	**1.6 MW**	**25 m/s (55.9 mi/hr)**	**49 meters (160.7 ft)**	**80 meters (262.4 feet)**	**130 meters (426.4 ft)**	**30 meters (98.4 feet)**	**124**

**From 'GW77-1500technical description.pdf', ©2012 Goldwind Science & Technology Co., Ltd*

***From 'SWT-3.0-113 Technical Description rev 2.pdf', ©2012 Siemens Wind Power A/S*

****From '1.6-100_xxHz_PCD_allComp_xxxxxxxx.ENxx.02.pdf', ©2011 General Electric Energy*

The wind turbine will be mounted on a tubular steel tower, a partial or fully concrete tower, or a lattice structure with an external wrap around it. All structures will be a neutral white or gray, provide internal ascent and direct access to the yaw system and nacelle and equipped with platforms and internal electric lighting. Access to the turbine is through a lockable steel door at the base of the tower. Platforms within the tower are connected with a ladder and a fall arresting safety system for access to the nacelle. A controller cabinet will be located inside each tower base. The turbine tower, on which the nacelle is mounted, consists of three to four sections manufactured from certified steel plates. All welds are made in automatically controlled power-welding machines and are ultrasonically inspected during manufacturing per American National Standards Institute (ANSI) specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion.

The rotor is a three-bladed cantilevered system mounted upwind of the tower. A yawing system will rotate the rotor around the turbine, to keep it upwind of the tower. The power output will be controlled by pitch regulation, with a variable rotor speed to maximize efficiency. The turbine uses a Supervisory Control and Data Acquisition (SCADA) system, which allows remote control and monitoring of the status of all turbines in the Project. The monitoring system provides status views of electrical and mechanical data, operation and fault status, meteorological data, and grid station data.

Lightning protection will be consistent with the wind turbine supplier's design and specifications and local utility or code requirements. Individual components are designed with specific lightning protection systems. Some of the lightning protection systems are lightning receptors, pick-up systems, integrated conductors along key components to ground, and surge arrestors.

Turbines will be lit per Federal Aviation Administration (FAA) requirements.

6.3 Description of Electrical System

The electrical system design and interconnection details will be determined through studies and discussions with MISO and the potential electrical off-taker.

At the base of each turbine, a step-up transformer will be installed to raise the voltage to power collection-line voltage of 34.5kV. Power will run through an underground collection system to

the Project's 34.5/115 kV step-up substation. Overhead collection lines may be required in certain areas if site conditions dictate. A new 115 kV generator lead line will exit the Project collector substation and will transmit power to OTPCo's Substation north of Jamestown, where it will interconnect with the electrical transmission system.

6.4 Project Construction

As an up to 200.5 MW wind energy project, CWF will benefit from economies of scale related to the Project's construction and operation. Wind energy projects have one-time costs that remain relatively stable despite the scale of the project. Therefore, a larger project will have cost advantages in comparison to a smaller project because the fixed costs are spread out over more units of output. Some examples of wind energy project costs that remain similar despite the size of the project include: an O&M Building, crane mobilization, an on-site supervisor, construction of a laydown yard, and substation procurement and construction.

The construction and restoration activities that are planned for the Project include:

- Order all necessary wind turbine components including towers, nacelles, hubs and blades;
- Complete environmental and cultural resource surveys;
- Complete preliminary survey and design to establish final locations of wind turbines, generators, access roads, collector system components, and the collector substation;
- Complete soil borings, testing, and analysis for proper foundation design and materials;
- Finalize turbine micrositing;
- Obtain all required regulatory approvals;
- Complete final design and construction of laydown area, access roads, and crane pads;
- Complete final design and construction of wind turbine generator foundations;
- Complete final design and construction of underground electrical collector system and communication system;
- Design and construct the Project collector substation;
- Design and construct the O&M facility;
- Complete tower placement and wind turbine erection;
- Complete commissioning and testing of facility;
- Begin commercial production;
- Complete site restoration including decompaction and revegetation.

The cranes will typically travel on native soil cleared of vegetation; however, when terrain conditions require it CWF will develop temporary crane paths. The temporary paths will be up to 40 feet wide, and consist of compacted earth or aggregate, depending on soil conditions. These paths will accommodate cranes with a track width of approximately 33 feet.
The grading design and construction will also include preparation of working surfaces for assembly and erection of the wind turbine generators (see Figure 9) As discussed in Section 6.4.2, foundations for the wind turbine generators will likely be cast-in-place reinforced-concrete

spread foundations. Construction will include excavation, formwork, and placement of anchor bolts, reinforcing steel, and placement and finishing of the ready-mix concrete.
The underground 34.5 kV electrical collector system and fiber optic communication system will likely be installed in a common trench. Junction boxes, where large portions of the collection system come together will be above ground; CWF will make every effort to locate these boxes in places where they will be unobtrusive to farming once construction is complete. The 34.5/115 kV collector substation will require construction of cast-in-place reinforced concrete foundations, erection of structural steel supports for electrical bus work and equipment, and installation of 34.5/115 kV transformers, circuit breakers, switches, instrument transformers, and other electrical equipment. The collector substation will be fenced and will include a prefabricated electrical equipment building with control, protection, and communications panels.

An O&M facility will be designed and constructed to accommodate personnel and equipment required for ongoing operation and maintenance. CWF will develop a well to provide potable water for the facility. Wastewater treatment facilities will be provided in accordance with all applicable state and local requirements.

6.4.1 Construction Management

CWF will designate an on-site construction manager. This manager's responsibilities include scheduling and coordinating the activities of engineering, procurement and construction contractors. The construction manager will be supported by other members of CWF's team who specialize in engineering, permitting, meteorology, environmental compliance, real estate and Geographic Information Systems (GIS) mapping. CWF will also supply a landowner and community liaison during construction to facilitate community relations and coordinate operations between the construction team, local residents and farmers, and local government.

Throughout the construction phase, ongoing coordination occurs among the Project's development, design, and construction teams. The construction manager coordinates execution of the work. This coordination includes safety and quality control programs, cost and schedule forecasting, as well as site security and ongoing communication with local officials, citizen groups, and landowners.

Following commissioning and commercial operation, the care, custody, and control of the facility transfers from the construction team to the operations staff. The construction manager works with the operations staff, the turbine supplier, and other construction and maintenance personnel to ensure a smooth transition from the start of construction to the commercial operation date of the Project. The operations staff will have full responsibility for the facility to ensure operations and maintenance are conducted in compliance with approved permits, prudent industry practice and the equipment manufacturer's recommendations.

6.4.2 Foundation Design

Each foundation design is determined through specific engineering, geotechnical sampling, and the turbine manufacturer's specifications. The tubular tower will be connected by anchor bolts to a cast-in-place reinforced-concrete foundation. The design of the turbine foundations accommodates turbine tower load specifications provided by the turbine supplier. The final dimensions and design of the foundations are dependent on soil conditions at the site. CWF currently estimates that the turbine foundations will be between 45 and 65 feet across and 7 to 15 feet thick. A majority of this foundation will be below grade with only a small pedestal for anchoring of the tower above ground. The final design parameters of the Project's foundations are ultimately decided by geotechnical surveys, turbine tower load specifications, and cost considerations. Figure 9 shows a typical wind turbine construction site.

6.4.3 Civil Works

The construction and completion of the Project will result in civil works and improvements to the land. Civil works will include the civil infrastructure, turbine foundations, and the underground electrical collection and grounding system. These civil works will include:

- Improvements, both temporary and permanent, to existing public roads required for transportation of equipment and components;
- Construction of roads adjacent to the wind turbine strings to allow construction and continued servicing of the wind turbines;
- Trenching and burying of underground 34.5 kV electrical collector cables and fiber optic cables;
- Clearing and grading for wind turbine tower foundations and installations;
- Clearing and grading for pad-mount transformers and other installations;
- Clearing and grading for Project 34.5 /115 kV collector substation and O&M building;
- Installation of on-site fencing

Improvements to existing public roads may include: increasing road width, modifying/ improving subgrade, adding aggregate surfacing, improving existing culverts and bridges for over-weight loads, and installing approaches or culverts to transition to new Project access roads.

No asphalt or other paving is anticipated for the construction of the access roads. Roads used to facilitate both construction (cranes) and continued operation and maintenance will be sited in consultation with local landowners and completed in accordance with local building requirements. Siting roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while allowing for the crossing of farm equipment wherever practical. The access roads will be approximately 16 to 18 ft wide and will be covered with aggregate surfacing to provide a stable driving surface under all weather conditions. Roads will likely consist of compacted subgrade covered with geotextile and compacted aggregate surfacing. Road accesses will meet state and/or local requirements. The specific turbine placement will determine the amount of roadway that will be constructed for the Project.

Improvements to existing public roads will be performed with the consent of township and county highway department officials and the North Dakota Department of Transportation (NDDOT), if required. CWF will enter into an agreement with the local road authorities to ensure coordination. Once construction is completed, roads will be regraded, resurfaced, or otherwise restored per the terms of the applicable permits and/or agreements.

6.4.4 Commissioning

The Project will undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing must occur for each component of the wind turbines, as well as the communication system, meteorological system, high voltage collection and feeder system, and the SCADA system.

6.5 Project Operations and Maintenance

6.5.1 Maintenance Schedule

The maintenance schedule for the wind turbines and any balance of plant equipment will be consistent with prudent industry practices and original equipment manufacturer standards. An initial maintenance inspection of each turbine will be performed after commercial operation. Following this initial inspection, each turbine will then receive annual inspections that will include inspections of the various components (wind braking system, lubricants, balance, terminal checks).

In addition to regularly scheduled site visits, the Project will be continuously monitored via the SCADA system. The SCADA system offers access to wind turbine generation or production data, availability data, meteorological and communications data, as well as alarms and communication error information. The SCADA systems will monitor Project status, allow for autonomous turbine operation, alert operations personnel, collect meteorological performance data, and provide diagnostic capabilities.

CWF and the turbine supplier will remotely monitor the Project on a daily basis. This will be accompanied by periodic visual inspections by qualified technicians. More frequent inspections will be made in the first three months of commercial operation to verify the Project is operating within expected parameters.

6.5.2 General Maintenance Duties

On-site personnel will perform all O&M services for the Project including maintenance on the wind turbines, roads, buildings, and electrical infrastructure. Some common maintenance duties may include:

• Track and follow the pre-set maintenance schedule;
• Coordinate the execution of corrective maintenance;
• Maintain all parts and tools;
• Perform or cooperate with required wildlife monitoring and reporting;
• Maintain all computer software and file any required reports.

6.5.3 Operations and Maintenance Building

The CWF O&M facility will be located at the Project Area, near the Project Substation. The size of a typical building used for this purpose is approximately 5,000 square feet. It will house the necessary equipment to operate and maintain the Project. The O&M building will allow maintenance staff to conduct on-site diagnostics, repairs, predictive maintenance, and preventive maintenance activities. This facility will also serve as the warehouse for critical spare parts.

6.6 Decommissioning and Restoration

CWF will decommission the Project and remove the wind facilities in accordance with North Dakota Wind Turbine decommissioning guidelines (NDAC Chapter 69-09-09). This includes:

- Dismantling and removal of all towers, turbine generators, transformers, and overhead cables;
- Removal of underground cables to a depth of twenty-four inches (60.96 centimeters);
- Removal of foundations, buildings, and ancillary equipment to a depth of four feet;
- Removal of surface road material and restoration of the roads and turbine sites to substantially the same physical condition that existed immediately before construction;
- Grading, adding topsoil, and reseeding according to Natural Resource Conservation Service (NRCS) technical guide recommendations and other agency recommendations, areas disturbed by the construction of the facility or decommissioning activities, unless the landowner requests in writing that the access roads or other land surface areas be retained.

CWF reserves the right to explore alternatives regarding Project decommissioning at the end of the Project Certificate term. Retrofitting the turbines and power system with upgrades based on new technologies may allow the Project to produce efficiently and successfully for many more years. Based on estimated costs of decommissioning and the salvage value of decommissioned equipment, the salvage value of the wind facility will exceed the cost of decommissioning. CWF will file a decommissioning plan with the Commission in accordance with NDAC Section 69-09-09-06.

7.0 Environmental Analysis

Maps of the Project were generated that indicate the presence or absence of the criteria included in NDAC Section 69-06-08-01. Appendix C includes reports of environmental studies conducted for the Project.

7.1 Description of Environmental Setting

The Project is located within Level IV End Moraine Complex and Drift Plains Ecoregions (USGS; Figure 10). Glacial activity affected both of these Ecoregions. The Drift Plains Ecoregion is flatter with higher concentrations of temporary and seasonal wetlands. The End Moraine Complex is characterized by parallel moraine ridges, and other glacial features such as eskers, kames, and thrust ridges. The glaciation of the site created significantly varied soil conditions, consisting of glacial till and clay deposits. The glaciation created a large prairie pothole complex in and around the site. This pothole complex provides forage for water birds and waterfowl, particularly during the spring and fall migrations.

Historically the site was predominantly tall grass prairie, which left rich, deep topsoil deposits and abundant organic material. Because of the productive soil and relatively level topography, the region is almost entirely cultivated and tilled. The principal crops grown in the Project are soybeans, corn, wheat, alfalfa and other small grains.

The town of Courtenay, North Dakota is located adjacent to the Project on the northeast side. The town of Jamestown, North Dakota is located approximately fifteen miles south of the Project. Land use within and surrounding the Project is rural in nature, with cultivated row cropping being the primary use.

7.2 Demographics

7.2.1 Description of Resources

Table 7.2-1 presents population information gathered from the U.S. Census Bureau 2010 Census (http://www.census.gov/) about Stutsman County and its relevant townships. The townships that are wholly or partially included in the Project are Ashland, Durham, Courtenay, Gray, and Nogosek. The North Dakota communities that are geographically closest to the Project are Courtenay (less than one mile northeast), Spiritwood Lake (approximately two miles south), Wimbledon (approximately four miles east), and Jamestown (approximately fifteen miles south). The 2010 U.S. Census gathered a wide variety of data points. The discussion herein does not address every demographic measure, but instead addresses the most applicable statistics related to the Project. The demographic characteristics that relate closest to the Project include: total population, total households, median household income, per capita income, the percentage of the population below poverty level, and the median age (see Table 7.2-1). Based on the 2010 U.S.

Census, the population of Stutsman County is 21,100 people. The per capita income of Stutsman County in 2011 inflation adjusted dollars is $24,653. Approximately eleven percent of individuals and seven percent of families in the county are below the poverty level. The median age in the county is 42 years of age. The primary industries in Stutsman County are classified as educational services, health care, and social assistance (26.8%), followed by manufacturing (12.5%), retail trade (11.6%), and agriculture, forestry, fishing and hunting, and mining (8.7%).

Table 7.2-1. Demographic Information for Stutsman County and Townships in the Project Area

	Total Population	Total Households	Median Household Income (Dollars)	Per Capita Income (Dollars)	Percentage of Population Below Poverty Level	Median Age
Stutsman County	21,100	8,931	46,317	24,653	11.1%	42
Ashland Township	51	27	182,891	75,139	0%	27.7
Courtenay Township	48	18	62,000	20,592	20.8%	60.3
Durham Township	50	16	78,182	18,486	0%	30.5
Gray Township	42	13	60,625	24,595	0%	56.2
Nogosek Township	19	10	31,250	136,468	10.5%	55.1

Source: U. S. Census Bureau, 2007-2011 American Community Survey

7.2.2 Impacts

The Project is designed to be socioeconomically beneficial to landowners, local governments, and communities. Landowner compensation is established by voluntary Land Lease and Wind Easement agreements. All landowners who are participating in the Project will receive compensation, whether or not they receive Project facilities on their land. This payment model provides an inclusive community-based economic benefit. The Project also offers landowners the voluntary opportunity to invest directly into the development of the Project, as discussed in Section 3.6. As also discussed in Section 3.6, another aspect of the Project's economic benefit is the Courtenay Community Fund, which establishes charitable funds for local community-based projects.

In general, the land surrounding each turbine can continue to be farmed or used for grazing. On average, approximately .5 acre to 1 acre of land per turbine is taken out of agricultural production. The annual lease payments to landowners are designed to positively compensate the

landowners for any land removed from agricultural production and the inconvenience of farming around the new obstacles in their field.

Construction of the Project will provide temporary increases to the revenue of the area through increased demand for housing, lodging, food services, fuel, transportation and general supplies.

Opportunity exists for sub-contracting to local contractors for gravel, fill, and civil work. Additional personal income will also be generated by circulation and recirculation of dollars paid out by the Project as business expenditures and state and local taxes.

General skilled labor is expected to be available in Stutsman County or North Dakota to serve the Project's basic infrastructure and site development needs. Specialized labor will be required for certain aspects of the Project. It may be necessary to import specialized labor from other areas of North Dakota or neighboring states because the relatively short construction duration often precludes special training of local or regional labor.

No substantial effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities nearby. The operations and maintenance of the facility will require few long-term laborers. The Project anticipates that sufficient permanent housing will be available within Stutsman County to accommodate these laborers.

7.2.3 Mitigative Measures

No mitigative measures are anticipated because the socioeconomic impacts associated with the Project will be positive. Wages will be paid and expenditures will be made to local businesses and landowners during the Project's construction and operation. The construction and operation of the Project will increase Stutsman County's tax base. In addition, lease payments paid to landowners will offset potential financial losses associated with removing a portion of their land from agricultural production. The Courtenay Community Fund will also contribute charitably and economically to the local communities.

Continuing to establish the central region of North Dakota as an important producer of alternative energy sources, such as wind, may also spur the development of wind-related businesses in the area, in turn contributing to the economic growth in the region.

7.3 Land Use and Managed Lands

7.3.1 Description of Resources

Agriculture

The land within and surrounding the Project Area is rural in nature, with cropland being the primary land use. Farmsteads are scattered within the Project Area, near accessible roads. No

known center pivot irrigation systems are present within the Project Area. Table 7.3-1 summarizes the acres and percentage of agricultural and other land uses within the Project.

Table 7.3-1 Land Cover in Project Area

Land Cover Type	Acres in Project Area	Percentage of Project Area
Cultivated Crops	16,034.4	66.2%
Pasture/Hay	2,723.3	11.3%
Emergent Herbaceous Wetlands	2,126.7	8.8%
Open Water	1,719.7	7.1%
Developed, Open Space	1,034.8	4.3%
Grassland/Herbaceous	475.2	2.0%
Developed, Low Intensity	40.2	0.2%
Deciduous Forest	35.9	0.1%
Woody Wetlands	14.7	0.1%
Evergreen Forest	1.0	0.0%

Human Settlement

A small portion of undeveloped land of the City of Courtenay lies within the Project Area. No Project facilities will be located within the City of Courtenay. According to on-site research and aerial photography review, approximately fifteen occupied or occupiable residences are within the Project Area; however, the Project will not cause displacement or relocation of residences or industrial facilities.

Mining

To the best of CWF's knowledge, no mining is taking place or has taken place in the Project Area. The closest gravel pit is approximately four miles south of the Project.

Missile Facilities

Coordination with the U.S. Department of Defense (DoD) Siting Clearinghouse from November 2, 2012 did not indicate the presence of missile facilities in or near the Project.

Federal Conservation Areas

CWF has not identified any federal conservation areas, including but not limited to Wildlife Management Areas (WMAs) or Waterfowl Production Areas (WPAs), within the Project Area. The minutes from a February 2013 meeting (included in Appendix H) illustrate that the USFWS holds wetland easements in the Project Area (see Figure 11), but does not hold land in fee title. The closest federal conservation areas are six WPAs (Siebert, Horton, Walsh, Durham, Nutt, and Blue Lake WPAs), which are all located outside of the Project Area, but within one mile. The WPAs are part of the USFWS's National Wildlife Refuge System. The USFWS either acquires WPAs as public land or protects them through perpetual easements.

State Conservation Areas
CWF has not identified any state conservation areas within the Project Area.

State Lands
CWF has not identified any state lands within the Project Area.

7.3.2 Impacts

A final site layout has not yet been determined. Table 5.1-1 provides estimates of the Project's impacts based on a preliminary layout. Land will be converted from an agricultural land use to wind energy use for the life of the Project.

Agriculture
The presence of the Project in Stutsman County will not significantly change the agricultural land use or general character of the area. The area will retain its rural character. As demonstrated by other wind energy projects in the Midwest, agricultural practices continue during construction and operations.
Landowners may continue to plant crops near and graze livestock up to the turbine pads. In some instances, agricultural practices will be impacted by requiring new maneuvering routes around turbine structures for agricultural equipment. The Project's access roads will be constructed in a low-profile manner to allow farming equipment to more easily cross the roads and continue efficient farming practices.
When construction occurs outside of winter months, temporary impacts to agriculture become more likely. These temporary impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction.

Human Settlement
The relationship between wind energy projects and property values is a topic that has been discussed across the United States. The discussion has centered on whether or not the presence of wind energy projects affects property values. There is no evidence to suggest wind projects have a negative impact on property values (Poletti and Associates, Inc. 2005, EcoNorthwest 2002, Sterzinger, Beck and Kostiuk 2003, Hoen, Impacts of Windmill Visibility of Property Values in Madison County, New York 2006, Hoen, Wiser, et al. 2009). CWF does not anticipate any direct impacts on property values (either positive or negative) as a result of the Project. An inclusive discussion of the impacts of wind energy projects on human settlement also includes the topics of sound, shadow flicker, and visual impact, which are discussed in Sections 7.6 and 7.9.

Mining
No negative impacts to mining in the Project Area are anticipated. The Project may purchase gravel from the gravel pit south of the Project. The gravel will be used to create access roads and to maintain, repair, and improve existing roads.

Missile Facilities
As discussed in Section 7.3.1, no missile facilities have been identified within the Project Area, therefore no impacts are anticipated.

Federal Conservation Areas
CWF identified USFWS Easements in the Project's boundary. CWF will design the Project to avoid the wetlands protected by easement to the extent possible. If impacts to protected wetlands are unavoidable, CWF will apply for a Special Use Permit, which would initiate the National Environmental Policy Act (NEPA) process. CWF will also work with the USFWS to offset any impacts that may occur.

State Conservation Areas
CWF has not identified any state conservation areas within the Project Area, therefore no impacts are anticipated.

State Lands
CWF has not identified any state lands within the Project Area, therefore no impacts are anticipated.

7.3.3 Mitigative Measures

Agriculture
CWF will work with landowners to avoid and minimize detrimental impacts to the land and crops during construction. When unavoidable impacts to crop planting, crop damage, soil compaction, or drain tile do occur, CWF will compensate landowners or use restorative techniques (including but not limited to drain tile repair and soil restoration) as mitigative measures.

Human Settlement
Wind turbines will be sited a minimum of 1,400 feet from occupied residences. The 1,400 ft setback, as designated by the Commission, should minimize or eliminate potential impacts related to sound, shadow flicker, and visual impact (see Sections 7.6 and 7.9 for further discussion).

Mining
No mining activities are located within the Project Area, therefore no mitigation is proposed. The impact to the gravel pit south of the Project Area is expected to be positive to the business owners.

Missile Facilities
No impacts are anticipated to missile facilities, therefore no mitigation measures are proposed.

Federal Conservation Areas

CWF does not propose any mitigative measures because impacts to protected wetlands are not currently anticipated. In the event that wetland impacts do occur, CWF will work with USFWS to develop appropriate mitigation.

State Conservation Areas

CWF does not propose any mitigative measures because no state conservation areas are present in the Project Area.

State Lands

CWF does not propose any mitigative measures because no state lands are present in the Project Area.

7.4 Public Services and Existing Infrastructure

7.4.1 Description of Resources

Local Services

The Project is located in a lightly populated rural area in east-central North Dakota. Established transportation and utility networks provide access and service to light industry, homesteads, farms and small cities near the Project.

Stutsman County communities include Buchanan, Cleveland, Courtenay, Jamestown, Kensal, Medina, Montpelier, Pingree, Spiritwood Lake, Streeter and Woodworth. As the county seat, Jamestown hosts the Stutsman County courthouse.

Northern Plains Electric Cooperative distributes electricity supplied by Basin Electric Power Cooperative and Western Area Power Administration to the Project Area (Northern Plains Electric Cooperative n.d.). OTPCo is also an electric utility that serves the Project Area. Montana-Dakota Utilities Co. supplies natural gas to Stutsman County.

Stutsman County provides emergency services, and together with the City of Jamestown, operates a Communications Center, which dispatches for three law enforcement agencies, four ambulance services, and fourteen fire departments (Stutsman County n.d.).

Stutsman Rural Water District, which is a member of the North Dakota Rural Water Systems Association, provides water services and water quality management for the Project Area (North Dakota Rural Water Systems Association 2009). Stutsman County also provides sewer, healthcare, and social services. The townships, Stutsman County, and the State of North Dakota all play a role in managing and maintaining the roads and highways in the Project Area.

Water Supply

Rural homes in Stutsman County typically use septic systems and water wells for their household needs. The North Dakota State Water Commission's (NDSWC) data for Stutsman County

indicates twelve domestic wells in the Project Area (ND State Water Commission Mapservice n.d.).

Transportation and Traffic
Interstate 94 is the closest major Interstate Highway to the Project. It runs east-west and is located approximately sixteen miles south of the Project. Paved roads that lie within the Project Area include North Dakota Highway 9, which follows a zigzag pattern and travels through the cities of Wimbledon and Courtenay. North Dakota Highway 20 lies outside of the Project Area, but runs nearby. Highway 20 is a north-south oriented highway that connects Jamestown to the Canadian border. The majority of other roads in the Project Area are two-lane county and township roads. Existing traffic volumes on the highways in and near the Project are presented in detail in Figure 12 (North Dakota Department of Transportation 2011). It is likely the county and township roads in the Project Area have far lower daily traffic levels than the nearby highways.

A Soo Line Railroad also runs diagonally along the northern boundary of the Project. In accordance with the Commission's siting criteria, no turbines will be sited in areas less than one and one-tenth times the height of the turbine from any railroad right-of-way. If design indicates Project facilities may cross the Soo Line Railroad, CWF will coordinate with Soo Line Railroad to ensure continued safe operations of the rail line.

Airports/Helipad
CWF's consultant, Federal Airways & Airspace (FA&A), conducted an Aeronautical Impact Statement of the Project in August 2012. The report showed that there are three public-use and six private-use airports within approximately twenty nautical miles of the Project.
The DoD Siting Clearinghouse informally reviewed the Project. The results of their review are provided in Appendix H and discussed below.

A preliminary Project layout was filed with the FAA via their online obstacle evaluation tool. As shown in Appendix H, CWF received determinations of no hazard from the FAA in March 2013 for the preliminary layout.

Tower Infrastructure and Telecommunications
Distribution lines run alongside roadways leading to residences. There are no existing transmission lines in the Project Area.

Two sixty meter temporary meteorological towers owned by CWF are located in Sections 25 and 12 in Durham Township (T143N, R63W). After the Project is built, up to four meteorological towers will remain throughout the Project's life. A sonic detection and ranging system (SODaR) or Light Detection and Ranging System (LIDaR) will also be located at the Project to record wind and meteorological characteristics. SODaR and LIDaR systems are similar to radar systems –except they use sound or light waves respectively rather than radio waves. Other than CWF's temporary meteorological towers, there are no Federal Communications Commission (FCC) towers located in the Project Area. As shown in Figure 13, three towers are located

within five miles of the Project Area. The three towers are owned by Dakota Central Telecommunications Cooperative, Soo Systems Radio Corporation, and New Cingular Wireless PCS, LLC.

According to FCC data, four digital television stations serve the Project Area: KXJB-TV (Channel 4), WDAY-TV (Channel 6), KJRR (Channel 7), and KVLY-RV (Channel 11). The FCC defines television service to existing based on received signal strength. If impacts to television service occur, CWF will work with affected parties on a case-by-case basis to fully restore television services.

Comsearch prepared a Licensed Microwave Report for the Project in August 2012 (see Appendix D). As discussed in the report, wind turbine structures have the potential to interfere with existing microwave systems and broadcast stations. The Comsearch report identifies two microwave beam paths that intersect the Project Area. The Project's final turbine siting will avoid interference with these identified microwave beam paths.

In addition, the National Telecommunications and Information Administration (NTIA) provided the preliminary plans for CWF to the federal agencies represented in the Interdepartment Radio Advisory Committee. A letter dated October 03, 2012 from the NTIA stated that after a forty-five day period of review, no federal agencies identified concerns regarding blockage of their radio frequency transmissions.

7.4.2 Impacts

Local Services
Potential impacts to public services, including emergency services, would likely relate to temporary construction activities that may disrupt roadways. No permanent impacts to local services are anticipated.

Water Supply
Private groundwater wells will provide the water supply for the Project's construction and operation activities such as dust abatement, blade washing, and concrete mixing at the batch plant. No wells are required to be abandoned for the Project. The Project will not require appropriation of surface water or permanent de-watering. Temporary de-watering of groundwater may be required during construction of the turbine foundations. The Project may require one low-volume well for the O&M facility.

Transportation and Traffic
Traffic will increase during construction of the Project. Construction vehicles, delivery trucks, and construction personnel's private vehicles will contribute to the expected increase in traffic. CWF estimates there will be an additional two hundred trips per day in the area during peak construction periods. Many of the roadways currently experience minimal traffic. The temporary addition of two hundred vehicle trips represents a large percentage increase. The increased traffic will likely be perceptible to area residents. Slow moving construction vehicles

may also cause delays on smaller roads, similar to the impact of farm equipment during harvest. Specific truck routes will be predetermined and particular to the required delivery locations.

Airports/Helipad
The installation of wind turbines creates potential hazards for air traffic. CWF received the FAA determinations of no hazard for its preliminary site layout in March 2013. CWF will continue to coordinate with the FAA as the design of the Project progresses.
In a letter dated November 2, 2012, the DoD reported that the Project will impact training at military operation area Devils Lake East and military training route IR-678. The Department of Defense recommended contacting the 5 OSS/A-3C, Minot Air Force Base, North Dakota. CWF contacted Minot Air Force Base through telephone and written correspondence. The telephone discussion indicated that the Project will not impact training at Devils Lake East or at military training route IR-679 since the Project's facilities are less than five hundred feet above ground level in height.

Tower Infrastructure and Telecommunications
Tables 4.2-1 and 4.2-2 discuss setback distances for the Project from existing infrastructure (see also Figure 19). With these setbacks in place, no impacts are anticipated for Project Area tower infrastructure. If site conditions require aboveground electrical collection lines, they are expected to be similar to distribution lines that are already present (located along the edges of fields and roadways) in the Project Area. The telecommunications infrastructure and services that could potentially be impacted by the Project's construction or operations include underground telephone and fiber optic cables, amplitude modulation (AM) and frequency modulation (FM) radio broadcasts, off-air television, non-federal government microwave beam paths, and land mobile radio.

7.4.3 Mitigative Measures

Local Services
Generally, construction activities will not close public roads for any considerable period of time. In the event that emergency services are needed for local residents, construction will stop, and any impeding equipment will be relocated so that emergency vehicles may access the emergency site. Once construction is complete, the Project will not impede emergency services. CWF and its construction team will coordinate with first responders, including but not limited to air ambulance, local sheriff's office(s) and local fire services, to develop a safety plan during construction and operations of the Project. CWF will also be in contact with local first responders to offer information about the Project and to answer any questions response teams may have regarding Project plans and details.

Water Supply
In the unlikely event that wells must be abandoned due to Project construction, they will be sealed as required by North Dakota law. Any temporary dewatering of groundwater during Project construction will be conducted under the requirements of the National Pollutant Discharge Elimination System (NPDES) permit and Storm Water Pollution Prevention Plan

(SWPPP). CWF will follow the Construction and Environmental Disturbance Requirements as provided by the North Dakota Department of Health (NDDOH).

Transportation and Traffic
Operating permits (i.e., oversize or overweight) will be acquired from the state, county, and/or townships, as necessary. CWF will work with Stutsman County and the applicable townships to develop construction traffic plans and follow recommended mitigation.

Airports/Helipad
CWF will seek approval of the final turbine layout from the FAA. The FAA's review will evaluate any potential interference with air traffic. CWF will follow the FAA's requirements for lighting and marking wind turbines and meteorological towers, which help to minimize potential air traffic hazards.

Tower Infrastructure and Telecommunications
CWF will comply with North American Electric Reliability Corporation (NERC) and MISO regulations and the Interconnection Agreement's requirements for the Project. CWF will also comply with North Dakota One Call requirements. Prior to construction, a utility locator service will map underground facilities. If the Project's facilities cross or otherwise affect existing telephone or fiber optic equipment, CWF will coordinate with service providers to avoid interference with their facilities. When the Project is constructed, CWF will provide information about the Project's facility locations to North Dakota One Call.
The final Project layout will not interfere with the two microwave beam paths' Worst Case Fresnel Zones (WCFZs). Thus, no mitigative measures are necessary.
If the Project negatively impacts telecommunication services, CWF will provide a specific mitigation plan and take the necessary steps to restore all impacted services.

7.5 Human Health and Safety

7.5.1 Description of Resources

Electromagnetic Fields
The term "electromagnetic fields" (EMFs) refers to two separate fields: electric fields and magnetic fields. Electric fields are produced by line voltage and magnetic fields are produced by flow of electric current in the lines. Electric fields and magnetic fields exist in the natural environment. When electric fields build-up electric charges in the atmosphere, thunderstorms occur. Earth also has a natural magnetic field that causes a compass needle to orient in a north-south direction and allows birds and other migrating species to navigate their routes (World Health Organization 2013).

In addition to the electromagnetic spectrum that occurs in nature, there are also human-made sources of EMFs. The electricity in power sockets has an associated electromagnetic field. Other common sources of EMFs include transmission lines, substations, and household appliances. The strength of EMFs decreases as the distance from the source increases.

With no major electrical transmission lines in the Project Area, the existing primary source of EMFs is likely the distribution lines that run to local homesteads and farms.

Hazardous Materials and Waste

With the Project's location being in rural North Dakota, contamination from large industrial or commercial activities is not likely. Potential hazards may exist in rural areas from old gasoline facilities, landfill sites, and private activities.

CWF is not aware of any landfills or hazardous waste handler sites within the Project Area. The U.S. Environmental Protection Agency (EPA) Superfund National Priorities List (NPL) database was reviewed to determine the potential major hazardous material issues within the Project Area. No NPL sites are present within the Project Area. The closest hazardous facilities listed under EPA programs are near Ketsal, ND. The Canadian Pacific Railroad (CP) Sulphuric Acid Spill occurred 3 mi. west of the project along the CP rail line that is adjacent to Courtenay's north boundary (EPA 2013). This site has been cleaned and is considered closed by the EPA.

The Project will require the use of petroleum products, including fluids for turbines and substation/transformer equipment. Each turbine will use three petroleum-based fluids during operation: gear box oil, hydraulic fluid, and gear grease. Transformers will contain mineral oil. Heavy machinery used during Project construction will also use minor amounts of hydraulic fluid.

Security

The Project is located in an area with a relatively low population density and crime rate.

Air Quality

North Dakota is one of only a handful of states that meet all national and state air quality standards. Ambient air quality monitoring continues to show exceptionally clean air in North Dakota (North Dakota Department of Health 2008).

7.5.2 Impacts

Electromagnetic Fields

EMFs will be associated with Project turbines, collector lines, and the Project's substation. After exhaustive scientific reviews of the link between EMFs and public health, the scientific consensus and understanding among public health agencies and officials is that magnetic fields and electric fields are unlikely to impact human or animal health and safety.
Several scientific organizations, including the American Medical Association, American Cancer Society, American Physical Society and National Academy of Sciences, have stated that the body of evidence in regard to EMFs, particularly magnetic fields, indicates that exposure to these fields do not present a human health hazard (Heath Jr. 1996, American Medical Association 1994, American Physical Society 2005, U.S. Department of Health and Human Services,

National Institutes of Health, National Cancer Institute 2010, National Institute of Environmental Health Sciences 2002).

Hazardous Materials and Waste
A Phase I Environmental Site Assessment of the Project Area will be conducted to identify any Recognized Environmental Conditions (RECs) that may exist, including any hazardous and/or potentially hazardous sites.
Project impacts include the potential for spills, leaks, and contamination from the use of petroleum products and hydraulic fluid.

Security
No impacts on the security and safety of local communities from construction and operation of the Project are anticipated. Wind turbine towers will be locked when O&M personnel are not utilizing the towers. The substation and the O&M Building will also be secured, locked facilities.

Air Quality
Temporary air quality impacts caused by construction-vehicle emissions and fugitive dust from construction activities may occur, but will be minimal and temporary. No impacts to air quality from the operations of the Project are anticipated. The Project may require a temporary concrete batch plant installed on site during construction. The batch plant will be decommissioned shortly after construction is complete and will comply with all air quality regulations.

7.5.3 Mitigative Measures

Electromagnetic Fields
As outlined in Table 4.2-1, the wind turbines will be set back 1,400 feet from occupied residences. Collector lines will be buried at a depth of approximately 3-4 feet. The Project's substation will be fenced off, locked and marked with warning signs. Burial of the collection lines and appropriate setbacks for the substation will create significant attenuation of any electrical or magnetic fields so that they are similar to pre-construction levels.

Hazardous Materials and Waste
CWF will generate minor amounts of petroleum waste during the Project's construction and operation. Any petroleum waste will be handled and disposed of in accordance with local, state, and federal regulations. Additional handling, storage, and reporting requirements for hazardous material will be covered in the Project's Spill Prevention, Control, and Containment Plan (SPCC), the NPDES permit required for the Project, and the SWPPP. CWF will implement its SPCC first as part of its SWPPP and later as part of standard operating procedures for the Project. The SPCC will provide detailed guidance for both the construction and the operations teams on the prevention of spills, as well as the control and containment of spills that the team is not capable of preventing.

Security

The following security measures will be taken to reduce the chance of physical and property damage, as well as personal injury, at the Project:

- Tables 4.2-1 and 4.2-2 discuss setback distances for the Project from existing infrastructure such as homes and roads.
- Temporary and permanent (safety) fencing will be used, as well as warning signs and locks on equipment and Project facilities.
- Access to wind turbines is only through a solid steel door that will be locked when not in use by O&M staff.
- Where necessary or requested by landowners, CWF will construct gates or fences, such as those that will be constructed around the Project Substation.
- During construction CWF will supply private security personnel to patrol the site and ensure the safety of the area.

Air Quality
CWF will minimize and manage dust emissions during construction. Any complaints that arise will be handled in an efficient and effective manner. The concrete batch plant will have an air quality permit from the NDDOH and will comply with all state and federal regulations to minimize air quality impacts.

7.6 Sound and Noise

7.6.1 Description of Resources

Noise is defined as unwanted sound. It may be made up of a variety of sounds of different intensities, across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted scale (dBA) is used to reflect the selective sensitivity of human hearing. This scale puts more weight on the range of frequencies that the average human ear perceives, and less weight on those that we do not hear as well, such as very high and very low frequencies. The C-weighted scale (dBC) is used to reflect human sensitivity at louder levels. This scale puts more weight on the lower frequencies than does the A-weighted scale.

The term ambient acoustic environment refers to the all-encompassing sound in a given environment or community. The outdoor ambient acoustic environment is a composite of sound from varying sources, distances, and directions. Common sound sources within an agricultural and/or rural environment include, but are not limited to, farm equipment such as tractors and combines, traffic on roadways, birds, and wind rustling through the vegetation. Typically, the ambient acoustic environment of a rural or agriculturally-oriented community has equivalent continuous sound levels (Leq, which is an energy-based time-averaged noise level)) ranging from 30 dBA to 60 dBA.

In agricultural and/or rural communities, the higher sound levels typically exist near roadways and near areas that experience greater human activities such as farming. In addition, compared with similar environments with lower quality wind resources, those environments with higher wind resources generally experience higher sound levels. Different communities can experience a wide variety of sound levels within their given ambient acoustic environments, and this variation of sound creates their respective spectral content.

7.6.2 Impacts

When in motion, wind turbines emit a perceptible sound. The level of this sound varies with the speed of the turbine and the distance of the listener from the turbine. Sound is generated from the wind turbine at points near the hub or nacelle, 80 to 100 m (262 to 328 ft) in the air, and from the blade tips as they rotate. CWF will conduct a thorough sound analysis once the final Project layout is determined. The analysis will include all potential turbine types and account for all noise-generating elements associated with wind turbines.

CWF proposes siting turbines at least 1,400 ft from residences plus the distance required to comply with the Stutsman County noise limit of a 50 dBA nighttime L50 noise level (L50 is the noise level exceeded 50 percent of the time).

7.6.3 Mitigative Measures

Impacts to nearby residents and other potentially affected parties from noise generated by the Project will be taken into consideration as part of the turbine siting. CWF will site turbines at least 1,400 ft from residences, plus the distance required to comply with the Stutsman County limit of a 50 dBA nighttime L50 noise level. To the extent that the sound characteristics of the selected turbine vary, CWF will ensure compliance with Stutsman County noise standards. The final layout will be designed to ensure cumulative impacts from all wind turbines, and maximum calculated noise levels for all turbine models, are at least 5 dB below the Stutsman County L50 noise limit of 50 dBA.

7.7 Cultural Resources

7.7.1 Description of Resources

Cultural resources represent a visible or otherwise tangible record of human activity on the landscape. These resources vary in size, shape, condition, and significance, among other characteristics. Some resources are clearly evident on the landscape, while others are buried or only visible to trained professionals.

Westwood Professional Services (Westwood) conducted a Class I Cultural Resource Literature Search (Literature Search) for CWF. A Literature Search is typically the first formal assessment

of historic, archaeological, and architectural resources for wind energy projects similar in size to CWF. The findings of the Literature Search for the Project are summarized in a report dated February 11, 2013 (Appendix E).

In Westwood's Literature Search, they included the Project Area and a one-mile buffer surrounding the Project Area. The inclusion of the one-mile buffer helps determine if the Project might physically or visually impact any culturally significant adjacent areas.

The Literature Search did not identify any archaeological sites within the Project Area or the one-mile buffer. Four previously recorded architectural resources were identified in the one-mile buffer around the Project Area; none were identified within the Project Area. None of the four structures are listed on the National Register of Historic Places (NRHP); however, three of the sites may be eligible for future listing.

7.7.2 Impacts

Any ground disturbing activity within the Project Area can potentially impact known or unknown cultural resources. There may also be possible concerns regarding visual impacts to properties within and adjacent to the Project Area.

7.7.3 Mitigative Measures

CWF provided the State Historical Society of North Dakota's State Historic Preservation Office (SHPO) with the February 11, 2013 Literature Search Report (Appendix E). SHPO responded in a letter dated February 26, 2013 (Appendix H). The February 2013 letter from SHPO recommended a Class II (reconnaissance) survey by a permitted architectural historian for standing structures in the visual Area of Potential Effect (APE), and a Class III (pedestrian) survey for all areas directly impacted by the Project, including crane paths, access roads, transmission lines and turbine pads. Before construction of the Project, CWF will conduct a Class III field inventory of the Project Area in an effort to identify all potential cultural, archaeological and architectural resources. The Project will follow the guidelines for cultural resource investigations as defined by SHPO and Section 106 of the National Historic Preservation Act. CWF plans to follow the recommendations of SHPO, and to continue coordination as further cultural resource surveys and updates to Project siting occur.

CWF will avoid impacting cultural, archaeological and architectural sites during the Project's design, construction and operation. CWF will coordinate with SHPO in the event that new, unrecorded sites are discovered during any phase of the Project. Before the Project's construction, CWF will also prepare an Unanticipated Discoveries Plan. The plan will detail a process for prompt communication and action regarding the discovery of previously unknown archaeological resources or human remains, should they be encountered. Once the plan is fully developed, it will be submitted to SHPO for review and approval.

7.8 Recreational Resources

7.8.1 Description of Resources

Many recreational opportunities exist in Stutsman County and the vicinity of the Project. Outdoor recreational opportunities include:

- fishing;
- boating;
- hiking;
- snowmobiling;
- camping;
- swimming;
- hunting;
- horse riding;
- picnicking;
- wildlife watching;
- softball;
- baseball;
- trap shooting;
- all-terrain vehicle (ATV) riding.

Parkhurst, Jamestown Reservoir, and Spiritwood Lake are three of the largest recreation areas in the vicinity of the Project.

One parcel of Private Land Open to Sportsmen (PLOTS) exists within the Project Area. Conservation PLOTS are parcels of land that are open to hunting through agreements between the North Dakota Game and Fish Department (NDGFD) and private landowners. The one PLOTS parcel within the Project Area is enrolled in the Habitat Plot Program, which involves multi-year contracts to protect, enhance, and create habitat and improve public access to hunting. Six PLOTS parcels are also located outside the Project Area, but within one mile (Figure 11). As discussed in Section 7.3, no state or federal conservation lands (such as WMAs, WPAs, and NWRs), which often also serve as recreational resources, have been identified in the Project Area.

In a letter dated February 08, 2013 (AppendixH) the North Dakota Parks and Recreation Department (NDPRD) stated that the Project does not affect their state park lands, but that the Project may affect state Land and Water Conservation Fund (LWCF) project sites. A map enclosed with the NDPRD letter indicates the Stutsman County Boat Docks and the Courtenay Softball Diamond are the nearest LWCF project sites. However, both sites are located outside of the Project Area.

7.8.2 Impacts

Because all Project facilities will be located on private lands, there will be no direct impacts to recreational facilities. Indirect impacts to recreational resources will be visual in nature and limited to persons using public or private property in or near the Project. See Section 7.9 for discussion of anticipated visual impacts and mitigative measures. Setbacks from public roads and non-leased properties (including public lands) will minimize any indirect impacts.
During construction, the noise from increased vehicle traffic and construction activities may temporarily alter the experience of those using recreational resources. In order to maintain safety standards, hunting and other recreational activities may be temporarily suspended when construction or maintenance personnel are working at the Project. After construction is completed, the specific locations of wind energy facilities may also impact hunting by affecting the direction in which hunters may shoot (to avoid striking wind facilities). NDPRD LWCF sites identified as Boat Docks and the Courtenay Softball Diamond are located outside of the Project boundary, but may be impacted visually. Additionally, the Project may be visible at many of the other recreational sites within twenty miles of the Project Area.

7.8.3 Mitigative Measures

To the extent possible, the Project's facilities will be placed in a manner so as to avoid impacts to recreational resources.

7.9 Visual Resources

7.9.1 Description of Resources

The topography of the Project Area is glaciated, gently rolling plains with elevations ranging from 1,507 feet to 1,592 feet (459 meters to 485 meters) above sea level (National Elevation Dataset (NED) Digital Elevation Model (DEM)). The landscape can be classified as rural open space. Agriculture, grasslands, wetlands, and water form the general mosaic of land cover for the ecoregion. The photos in Appendix F show typical landscapes within the Project Area. A topographic map of the Project Area is shown in Figure 3.

In the Project Area, local vegetation is predominantly agricultural crops and emergent wetland vegetation. Crops include corn, soybeans, wheat, and forage crops, which visually create a low uniform cover. A mix of deciduous and coniferous trees planted for windbreaks typically surrounds farmsteads. Generally, these areas are isolated groves or windrows established by the landowner/farmers to prevent wind erosion and shelter dwellings.

The settlements in this area of Stutsman County are residences (approximately fifteen occupied or occupiable structures in the Project Area, with an additional fourteen structures within one mile of the Project Area) and farm buildings (uninhabited) scattered along rural county roads. These structures are focal points in the dominant open space of the vicinity.

7.9.2 Impacts

Wind Turbine Appearance

All potential turbine models will be similar in appearance, with an enclosed white or gray tower, a single hub, and three blades. The primary difference between layouts will be the RD and the number of turbines. In general, larger RD turbines will have larger output and thus the Project will require fewer turbines. The three representative models will have the following RD and number of turbines:

Table 7.9-1 Rotor Diameter Turbine Height and Number of Turbines

	GE 1.6-100	GoldWind GW77	Siemens SWT 113
Rotor Diameter	329 ft (100 m)	253 ft (77 m)	371 ft (113 m)
Hub Height	263 ft (80 m) or 315 ft (96 m)	279 ft (85 m) or 329 ft (100 m)	263 ft (80 m) or 312 ft (95 m)
Total Height	427 ft (130 m) or 493 ft (150 m)	406 ft (123.5 m) or 455 ft (138.5 m)	448 ft (136.5 m) or 498 ft (151.5 m)
Number of Turbines	125	133	87

Though the Siemens turbine (with a 95 m tower) is about 20 percent taller than the Goldwind turbine (with an 80 m tower), using a Siemens turbine will require about 35 percent fewer turbines, so the larger turbine would be expected to have a smaller overall visual impact on the surrounding area.

Some of the Project's turbines will be located within the viewshed of lands owned or managed by the NDGFD, the NDPRD, and the USFWS as well as other natural areas and may be visible by people using those areas. Figures 11 and 19 identify recreation and wildlife areas within the Project's vicinity.

While wind turbines will impact the visual surroundings of the Project Area, the degree of visual impact will vary based upon personal preferences. The placement of turbines in the landscape will have an effect on the existing visual experience of the site and in nearby areas. Discussion of the aesthetics of the proposed wind farm is based on subjective human responses. For some viewers, the Project could be perceived as a visual intrusion; for other viewers, the Project may have its own positive aesthetic qualities. Operation of the wind farm will generate minimal vehicle traffic and will not significantly increase day-to-day human activity in the area. Therefore, the Project Area will retain a rural sense and remote character. Also, although "industrial" in form and purpose, turbines are essentially "farming" the wind for energy. Though turbines are high-tech in appearance, they are compatible with the rural and agricultural heritage of the area.

The topography in the vicinity is generally flat and the vegetation is uniformly low, making the high topography vulnerable to visual disruptions. Visual impacts will be most evident to people traveling north and south along County Highway 20, and east and west along County Highway 9. There are no state highways within the Project Area. U.S. Highway 94 runs east and west and is located approximately 17 miles south of the Project boundary.

The FAA requires obstruction lighting or marking of structures more than 200 feet above ground to provide safe air navigation (FAA 2005). CWF has applied to the FAA for approval of a lighting plan that is compliant with FAA requirements. It is anticipated that approximately 50 percent of the turbines will be lit. FAA requires synchronized flashing of red lights for wind turbines.

Shadow flicker caused by wind turbines is defined as alternating changes in light intensity at a given stationary location, or receptor, such as the window of a home. In order for shadow flicker to occur, three conditions must be met: first, the sun must be shining with no clouds to obscure it; second, the rotor blades must be spinning and must be located between the receptor and the sun; and third, the receptor must be sufficiently close to the turbine to be able to distinguish a shadow created by it.

Shadow Flicker

Shadow flicker intensity and frequency at a given receptor are determined by a number of interacting factors:

- Sun angle and sun path – As the sun moves across the sky on a given day, shadows are longest during periods nearest sunrise and sunset, and shortest nearest midday. They are longer in winter than in summer. On the longest day of the year (the summer solstice), the sun's path tracks much farther to the north and much higher in the sky than on the shortest day of the year (the winter solstice). As a result, the duration of shadow flicker at a given receptor will change significantly from one season to the next.
- Turbine and receptor locations – The frequency of shadow flicker at a given receptor tends to decrease with greater distance between turbine and receptor. The frequency of occurrence is also affected by the sightline direction between turbine and receptor. A turbine placed due east of a given receptor will cause shadow flicker at the receptor at some point during the year while a turbine placed due north of the same receptor at the same distance will not, due to the path of the sun.
- Cloud cover and degree of visibility – As noted above, shadow flicker will not occur when the sun is obscured by clouds. A clear day has more opportunity for shadow flicker than a cloudy day. Likewise, smoke, fog, haze, or other phenomena limiting visibility would reduce the intensity of the shadow flicker.
- Wind Direction – The size of the area affected by shadow flicker caused by a single wind turbine is based on the direction that the turbine is facing in relation to the sun and location of the receptor. The turbine is designed to rotate to face into the wind, and as a result, turbine direction is determined by wind direction. Shadow flicker will affect a larger area if the wind is blowing from a direction such that the turbine rotor is near

perpendicular to the sun-receptor view line. Similarly, shadow flicker will affect a smaller area if the wind is blowing from a direction such that the turbine rotor is near parallel to the sun-receptor view line.

- Wind Speed – Shadow flicker can only occur if the turbine is in operation. Turbines are designed to operate within a specific range of wind speeds. If the wind speed is too low (cut-in speed) or too high (cut-out speed), the turbine will not operate, eliminating shadow flicker.
- Obstacles – Obstacles, such as trees or buildings, which lie between the wind turbine and the receptor have a screening effect and can reduce or eliminate the occurrence of shadow flicker.
- Contrast – Because shadow flicker is defined as a change in light intensity, the effects of shadow flicker can be reduced by increasing the amount of light within a home or room experiencing shadow flicker.
- Local topography – Changes in elevation between the turbine location and the receptor can either reduce or increase frequency of occurrence of shadow flicker, compared to flat terrain.
- Maintenance – Turbines which are inoperable for maintenance reasons will obviously cause no occurrence of shadow flicker.

By simulating the sun path throughout a whole year, the software calculates the number of hours per year as well as maximum minutes per day during which a given receptor could realistically expect to be exposed to shadow flicker from nearby wind turbines. Shadow flicker can be modeled using either "expected" case or "worst case" scenarios. Worst case scenarios are based on simulated conditions where:

- There is always sunshine,
- The turbine is always in operation,
- The wind direction always orients the rotor perpendicular to the sun-receptor sightline,
- Specific window configurations on houses are not considered, and
- There are no local obstacles blocking potential shadows such as buildings or vegetation.

A worst case scenario can be refined to represent a less conservative expected scenario by incorporating one or more realistic features in the model:

- Wind Direction – Turbine rotors do not orient themselves to the sun all day, every day, as modeled in the worst case scenario. To adjust for actual rotor direction, wind data is entered into the model. For the analysis included in this application, wind data was taken from the temporary meteorological tower located in the Project Area.
- Turbine Operating Hours – The turbine will not be operational all of the time due to local winds being outside of turbine operation specifications, or due to maintenance. Project specific wind rose data again was incorporated to reflect the frequency of sufficient wind speed to activate the turbine. The expected percentage of time the turbine is activated is multiplied by the number of minutes of shadow flicker.

- Actual Sunshine Hours – Sunshine hours are affected by cloud cover, fog or haze, time of day, and time of year. This data is provided by the WindPro software which selects the nearest weather station from its database.

Combining one or more of these three mitigating factors creates a less conservative scenario which aims to produce a scenario closet to the actual expected results.

At a distance of 1,400 feet or greater (the Project minimum setback for residences), receptors will typically experience shadow flicker only when the sun is low in the sky. If a residence does experience shadow flicker, it most likely will be only during a few hours of a few days per year from a given turbine, and for a total of only a fraction (less than one percent) of annual daylight hours. CWF will conduct a shadow flicker analysis when the Project's final turbine layout has been determined.

7.9.3 Mitigative Measures

To mitigate visual impacts of turbines, CWF will adhere to the following measures:

- Turbines will be uniform in color;
- Turbines will not be located in biologically sensitive areas such as parks, WMAs, WPAs, SNAs or wetlands;
- Turbines will have lighting only to meet the minimum requirements of FAA regulations;
- Existing roads will be used for construction and maintenance where possible to minimize the amount of new roads constructed;
- Access roads created for the wind farm facility will be located on gentle grades to minimize erosion, visible cuts, and fills;
- Turbines will be located no closer than 1,400' from homes.

CWF will conduct a shadow flicker analysis once the final turbine layout has been determined. CWF will provide a shadow flicker report to the Commission prior to the public hearing on this application. In addition to the 1,400' setback from residences, other mitigation measures for shadow flicker will be considered and implemented on a case-by-case basis as necessary. Such mitigation measures may include the following

- Provide vegetation or fencing to be used as screening or a buffer from shadow flicker, where appropriate and reasonable;
- Provide indoor screening, where appropriate and reasonable.

7.10 Effects on Land-Based Economies

7.10.1 Description of Resources

Agriculture

According to the United States Department of Agriculture's 2007 Census of Agriculture, Stutsman County ranks sixth out of all North Dakota Counties for the total value of agricultural products sold. Stutsman County totals 1,043 farms, with the average farm size at 1,144 acres. The top crops (in acres) include soybeans, wheat, and corn, followed by foraging crops (hay and haylage, grass silage, and greenchop) and barley. Cattle top the list of livestock raised in Stutsman County, followed by sheep, colonies of bees, horses, and bison (United States Department of Agriculture 2009).

The market value of agricultural production in Stutsman County in 2007 was approximately $198,283,000. Crop sales accounted for approximately eighty-five percent of that total value. The value of livestock, poultry, and their products accounts for the remaining fifteen percent (United States Department of Agriculture 2009).

Prime farmland is the land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The NRCS has two classifications for prime farmland. The first is where all areas of the soil series are classified prime farmland. The second is where only the drained areas of the soil series are prime farmland. The NRCS also identifies farmland of statewide and local importance, which is land that is important for the production of food, feed, fiber, forage, and oilseed crops (USDA Natural Resources Conservation Service n.d.). Generally, additional farmlands of statewide or local importance include those that are nearly prime and that produce high yields of crops in an economic manner when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmland soils if conditions are favorable. Table 7.10-1 lists the soils considered prime farmland and soils of statewide or local importance within the Project Area. Figure 14 illustrates the prime farmland soil distribution in the Project Area.

Table 7.10-1. Prime Farmland and Farmland of Statewide Importance in the Project Area

Soil Type	All Areas Prime Farmland	Prime Farmland Only When Drained	Farmland of Statewide Importance	Area (acres)	Percentage of Project Area
Barnes-Buse-Parnell complex, 0 to 6 percent slopes			X	110.93	0.45%
Barnes-Buse loams, 3 to 6 percent slopes	X			6693.15	26.88%
Barnes-Cresbard loams, 3 to 6 percent slopes			X	63.10	0.25%
Barnes-Sioux complex, 3 to 9 percent slopes			X	37.35	0.15%
Barnes-Svea loams, 0 to 3 percent slopes	X			694.75	2.79%
Barnes-Svea loams, 3 to 6 percent slopes	X			1198.97	4.82%

Soil Type	All Areas Prime Farmland	Prime Farmland Only When Drained	Farmland of Statewide Importance	Area (acres)	Percentage of Project Area
Buse-Barnes-Parnell complex, 0 to 9 percent slopes			X	285.74	1.15%
Clontarf fine sandy loam, 2 to 6 percent slopes			X	0.19	0.00%
Divide loam, 0 to 2 percent slopes	X			11.45	0.05%
Divide loam, loamy substratum, 0 to 2 percent slopes	X			21.15	0.08%
Fordville-Renshaw loams, 0 to 2 percent slopes			X	137.14	0.55%
Fordville-Renshaw loams, 2 to 6 percent slopes			X	5.25	0.02%
Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes			X	1732.67	6.96%
Hamerly-Tonka complex, 0 to 3 percent slopes		X		518.32	2.08%
Hamerly-Wyard loams, 0 to 3 percent slopes	X			1815.70	7.29%
Hamerly loam, 0 to 3 percent slopes	X			12.85	0.05%
Marysland loam, 0 to 1 percent slopes		X		9.61	0.04%
Overly-Bearden silty clay loams, 0 to 2 percent slopes	X			5.62	0.02%
Svea-Cresbard loams, 0 to 3 percent slopes			X	208.04	0.84%
Tonka silt loam, 0 to 1 percent slopes		X		29.81	0.12%
Vallers loam, 0 to 1 percent slopes		X		95.21	0.38%
TOTAL				13,687	54.97%
(United States Department of Agriculture 2012)					

Woodlands

Economically significant woodlands are not located in the Project Area. Tree-covered areas generally serve the purpose of woodlots or windbreaks associated with homes. Woodlands within the Project Area are shown in Figures 6 and 15.

7.10.2 Impacts

Agriculture
The semi-permanent loss of approximately fifty acres of agricultural land will not result in the loss of agriculture-related jobs or net income. Except for the physical locations of the Project's facilities (turbines, access roads, an O&M Building, a substation, and above ground electrical facilities), the land in the Project Area will remain available for agricultural activities.

The final site layout has not been determined, but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. CWF will determine the actual impacts to agricultural production when the Project's layout is finalized.

No impacts to livestock health or safety in relation to the Project are anticipated.

Woodlands
Since a majority of the woodlands on the Project Area are associated with homesteads and windbreaks, minimal impacts are anticipated. Some windbreaks may need to be minimally disturbed for access road locations.

7.10.3 Mitigative Measures

Agriculture
Only the land for the turbines, the O&M Building, certain electrical equipment (including a substation), and access roads will be unavailable for crop production or grazing during the life of the Project. Once the wind turbines are constructed, all land surrounding the turbines and access roads may still be farmed or grazed. During construction, CWF will fence off and make any construction areas inaccessible to livestock.

The revenue lost from removing land from agricultural production will be offset by Land Lease and Wind Easement payments to the associated landowners. CWF will also compensate landowners for any crop damage or soil compaction that occurs during construction of the Project. Areas disturbed during construction will also be repaired and restored to pre-construction contours and characteristics to the extent practicable. This restoration will allow the Project's land surfaces to drain properly, blend with the natural terrain, re-vegetate naturally, and avoid erosion.

Drain tile systems may be present in the Project Area. CWF will gather information about the existence of drain tile from landowners and other data sources, possibly including but not limited to infrared aerial photographs. In the event that damage occurs to drain tile or private ditches as a result of construction activities or operation of the Project, CWF will work with the affected property owners to repair any damages. Other drainage systems including private ditch networks

exist within the Project Area and may need to be crossed with project facilities. CWF will ensure that the free flow of water in these channels is not impeded by the construction or operation of the Project.

Woodlands

No impacts are anticipated to woodlands. If unavoidable impacts to woodlands arise, then individual trees will be replaced at a ratio of 2:1 and plantings will be monitored for three years per the Commission's tree and shrub mitigation specifications.

7.11 Soils

7.11.1 Description of Resources

North Dakota, including Stutsman County, was subject to glacial migration and as a result has surface boulders and scraped out depressions. Soils within a few feet of the surface are generally a fine loam with glacial till. The USDA has mapped 35 soil map units within the Project Area (Figure 16) (United States Department of Agriculture 2012). These soils are primarily well-drained loams derived from underlying till, glaciofluvial sediments, and alluvial sediments. Two soil types comprise approximately 60 percent of the Project Area: Barnes-Buse loams (3 to 6 percent slopes) and Barnes-Buse-Langhei loams. Table 7.11-1 provides a summary of the soil map units within the Project Area, including their acreages and percentages of the Project Area.

Approximately 98 percent of the Project Area is underlain by partially hydric soils (i.e., soils containing hydric inclusions); however, soils classified as entirely hydric comprise less than one percent of the Project Area (United States Department of Agriculture 2012). All of the soils in the Project Area (with the exception of areas mapped as "Water") have low to moderate susceptibility to erosion by water (i.e., K-factors from 0.1 to 0.4). The majority (98 percent) of soils in the Project Area are in Wind Erodibility Group 6 or 4L, which correspond to Wind Erodibility Indices of 86 tons/acre/year and 48 tons/acre/year, respectively (United States Department of Agriculture 2012).

Table 7.11-1. SSURGO Soil Map Units within the Project Area

Soil Unit Name	Acres	Percent of Total Acreage
Barnes-Buse loams, 3 to 6 percent slopes	6,709.4	27.7%
Barnes-Buse-Langhei loams	6,087.6	25.1%
Barnes-Svea loams	1,897.4	7.8%
Vallers-Hamerly loams, saline, 0 to 3 percent slopes	1,837.6	7.6%
Hamerly-Wyard loams, 0 to 3 percent slopes	1,814.2	7.5%
Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes	1,734.2	7.2%
Parnell silty clay loam, 0 to 1 percent slopes	1,263.2	5.2%
Hamerly-Tonka complex, 0 to 3 percent slopes	519.1	2.1%

Soil Unit Name	Acres	Percent of Total Acreage
Southam silty clay loam, 0 to 1 percent slopes	506.8	2.1%
Buse-Barnes-Parnell complex	333.4	1.4%
Svea-Cresbard loams, 0 to 3 percent slopes	208.0	0.9%
Cavour-Ferney loams, 0 to 3 percent slopes	172.6	0.7%
Bearden-Colvin silt loams, saline, 0 to 2 percent slopes	163.8	0.7%
Fordville-Renshaw loams, 0 to 2 percent slopes	142.4	0.6%
Water	112.8	0.5%
Barnes-Buse-Parnell complex, 0 to 6 percent slopes	110.9	0.5%
Vallers loam, 0 to 1 percent slopes	95.2	0.4%
Cresbard-Cavour loams, 0 to 3 percent slopes	92.0	0.4%
Colvin silt loam, very poorly drained, 0 to 1 percent slopes	86.2	0.4%
Barnes-Cresbard loams, 3 to 6 percent slopes	63.1	0.3%
Hamerly-Cresbard loams, 0 to 3 percent slopes	46.0	0.2%
Water, intermittent	38.8	0.2%
Barnes-Sioux complex, 3 to 9 percent slopes	37.3	0.2%
Tonka silt loam, 0 to 1 percent slopes	29.8	0.1%
Buse-Barnes loams, 15 to 35 percent slopes	21.2	0.1%
Divide loam, loamy substratum, 0 to 2 percent slopes	21.2	0.1%
Hamerly loam, 0 to 3 percent slopes	12.9	0.1%
Divide loam, 0 to 2 percent slopes	11.5	0.0%
Marysland loam, 0 to 1 percent slopes	9.6	0.0%
Sioux-Arvilla complex, 2 to 6 percent slopes	8.5	0.0%
Renshaw-Sioux complex, 2 to 6 percent slopes	7.2	0.0%
Overly-Bearden silty clay loams, 0 to 2 percent slopes	5.6	0.0%
Buse-Sioux complex, 9 to 35 percent slopes	4.4	0.0%
Fossum fine sandy loam, 0 to 1 percent slopes	1.9	0.0%
Clontarf fine sandy loam, 2 to 6 percent slopes	0.2	0.0%
Total	**24,206.0**	**1.0**

7.11.2 Impacts

The impact to soils in the Project site will be limited to areas removed from agricultural production, either for turbines and associated structures, or for road construction. Both of these impacts will be relatively minor. Turbine foundations are comparatively small, and access roads will be single lane roadways. In isolated cases, grading may be required for roadway construction. Since land immediately adjacent to the turbines and access roads can be used for pasture or row crops, the Project will only impact those lands used directly for turbine foundation or roadway construction. Areas to be temporarily impacted for contractor staging and lay-down

areas will be determined prior to construction. A discussion of impacts to prime farmland soils is in Section 7.10.

The potential for wind and water erosion exists in the soil types found on the site. Construction practices will minimize soil erosion during and after turbine construction, and impacts are not expected to be measurable.

7.11.3 Mitigative Measures

Following construction, CWF will restore disturbed areas to pre-construction conditions. Soil erosion, compaction, and other related disturbance will be minor and short-term, and will be minimized by implementing environmental protection measures. These measures will include Best Management Practices (BMPs) for erosion and sediment control, such as temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. If cuts are made during construction, top soil will be segregated and reapplied after final contours have been graded. 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 will result from the Project.

7.12 Geologic and Groundwater Resources

7.12.1 Description of Resources

With the exception of the southwest corner of the state, North Dakota was glaciated during the Pleistocene. Glaciation resulted in marked changes in the topography and drainage of Stutsman County (Winters 1963). The eastern half of Stutsman County, which includes the Project Area, lies within the Glaciated Plains, a physiographic region of North Dakota dominated by landforms and sediments derived by glaciers. The glaciers eroded the bedrock surface and deposited glacial drift (a general term applied to all rock material [clay, silt, sand, gravel, boulders] transported by a glacier and deposited).

The landscape of the Project Area and eastern Stutsman County as a whole is characterized by gently rolling hills and swales with low to moderate relief. Drainage is typically nonintegrated, consisting of a network of poorly connected lakes, sloughs, and seasonal streams (Manz and Biek 2004). Groundwater in the region occurs in glacial drift and consolidated rocks of Pierre Shale and Dakota Sandstone (Abel, et al. 1990, United States Department of Agriculture 2006). The water from glacial drift is typically fresh or saline and hard or very hard (United States Department of Agriculture 2006). Domestic groundwater supply appears to be fairly accessible in the Project Area based on the North Dakota State Water Commission (NDSWC) database, which identifies various types of wells within the Project Area (North Dakota State Water Commission 2013).

A review of United States Geological Survey (USGS) topographic maps revealed no sand, gravel, or other mines within the Project Area. The Project Area is not located in an area with

economic reserves of hydrocarbons, as supported by information from the North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division (North Dakota Division of Oil and Gas 2013), including well locations and mapped oil and gas fields.

7.12.2 Impacts

Impacts of the proposed Project to available geologic resources are likely to be limited. Due to the thickness of surficial materials, excavation or blasting of bedrock is extremely unlikely.

Impacts to groundwater resources, including aquifers, are not anticipated as water supply needs will be quite limited. It is probable that operations and maintenance water requirements will be satisfied with a single domestic-sized water well. Based on the small amount of increased impervious surface area that will be created by Project components, the Project will likely have minimal impacts on regional groundwater recharge. In isolated areas where the groundwater table is locally elevated, Project construction activities such as excavation and construction of foundations may encounter groundwater. The construction of turbine and other foundations may therefore affect shallow groundwater flow patterns; however, such impacts will likely be minor and highly localized, with the groundwater resuming its normal course of flow downgradient of the foundation. If dewatering of excavations is necessary, water will be discharged to the surrounding surface, allowing it to infiltrate back into the ground to minimize potential impacts.

In addition, each turbine will be located a minimal distance of 1,400 feet from existing occupied residences, thereby minimizing the risk of impacts on private wells in the area, which are assumed to be located in proximity to the occupied residences they serve. Construction of the turbine foundations is not likely to require subsurface blasting; therefore, disturbances to groundwater flow from newly fractured bedrock are not anticipated.

7.12.3 Mitigative Measures

Impacts to geologic resources are not anticipated and mitigation is not expected to be necessary. Wind turbine locations are not likely to affect the use of existing water wells because the turbines will not be sited within 1,400 feet of occupied residences. In the event that subsurface blasting is required, a blasting plan will be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Any dewatering required during construction will be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential impacts.

7.13 Surface Water and Floodplain Resources

7.13.1 Description of Resources

Surface water and floodplain resources were identified for the Project Area using FEMA Flood Insurance Rate Maps (FIRM), USGS topographic maps, NLCD (National Land Cover Database), USFWS National Wetlands Inventory (NWI) data, and the National Hydrography Dataset. According to NLCD data, emergent herbaceous wetlands and open water account for 3,846.4

acres, or approximately 16 percent of the entire Project Area. NWI and National Hydrography Dataset waters are depicted on Figure 17. The Project Area is located within the Middle Sheyenne Watershed.

According to FEMA FIRMs reviewed for the Project Area, the entirety of the Project Area lies within unshaded Zone X, which is indicates an area of minimal flood hazard (Federal Emergency Management Agency 2013).

7.13.2 Impacts

Project facilities will be designed to avoid impacts on surface water resources to the extent practicable. Wind turbines will be built on uplands to avoid surface water resources in the lower elevations to the extent practicable. However, Project facilities, such as underground electrical collector lines, access roads, turbine pads, and the O&M building, will impact land and, therefore, potentially impact surface water runoff within the Project Area. These impacts are expected to be minimal.

The Project will not impact known floodplain areas.

7.13.3 Mitigative Measures

Access roads constructed adjacent to wetlands or intermittent streams and drainage ways will be designed in a manner so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. An NPDES permit application will be prepared by CWF and submitted to the NDDOH prior to the construction of the wind turbines and access roads.

7.14 Wetlands

7.14.1 Description of Resources

The potential for wetlands within the Project site were identified by reviewing NWI data and wetland easement locations obtained from the USFWS. No formal wetland delineations have yet been completed. Desktop analysis of NWI data identified 3,143.7 acres of the Project Area classified as NWI wetlands (Figure 17). The vast majority of NWI wetlands on the site are freshwater emergent wetlands. No riverine or floodplain wetlands were found on the site. As of October 2012, approximately 7,800 acres of the Project Area are in USFWS wetland easements.

Approximately 98 percent of the Project Area is underlain by partially hydric soils (i.e., soils containing hydric inclusions); however, soils classified as entirely hydric comprise less than one percent of the Project Area (United States Department of Agriculture 2012).

On-site wetland delineation will be performed in 2013 within the construction area footprint of the proposed Project layout. The delineation will be performed using the methods described in the 1987 United States Army Corps of Engineers (USACE) Wetland Delineation Manual

(Environmental Laboratory 1987), the Great Plains Regional Supplement to the 1987 Manual (United States Army Corps of Engineers; Wakeley, J.S.; Lichvar, R.W.; Noble, C.V. 2010). These methods incorporate a three-parameter approach using vegetation, soils, and hydrology to identify the presence of freshwater wetland. The extent of relatively permanent waters (RPWs), other than wetlands, will be determined by applying the USACE definition of Ordinary High Water Mark (OHWM) and methods for jurisdictional determinations as detailed in the USACE Jurisdiction Determination Form Instructional Guidebook (Corps JD Guidebook) revised in 2007, including the December 2, 2008 USACE/USEPA revised Rapanos guidance.

7.14.2 Impacts

Wetland impacts as a result of construction and operation of the Project are yet to be determined. Impacts will be assessed once the on-site wetland field delineation is completed. The finalized turbine layout will take advantage of higher elevations and avoid low-lying areas which are more likely to contain wetland areas. The Project layout will be designed to ensure that the majority of wetland sites are left intact. CWF plans to avoid direct impacts to protected wetland basins within USFWS wetland easements, thereby avoiding the need for a USFWS compatibility analysis and issuance of a Special Use (temporary impact) or Right-of-Way Permit (permanent impact).

7.14.3 Mitigative Measures

Wetlands will be avoided to the extent practicable during construction and operation of the Project and a pre-construction inventory of existing wetlands will be conducted and filed with the Commission and applicable agencies prior to the hearing. Prior Project authorization under a Section 404 USACE Nationwide Permit (NWP) will be obtained if impacts on Clean Water Act (CWA) jurisdictional waters are unavoidable and less than 0.5 acre. Permanent impacts on jurisdictional waters will be mitigated according to USACE requirements.

CWF plans to avoid direct impacts to protected wetland basins within USFWS wetland easements thereby avoiding the need for a USFWS permit. If boring for underground collection is required beneath protected wetland basins within USFWS wetland easements, CWF will give USFWS prior notice. If impacts on these areas cannot be avoided, the USFWS will be consulted regarding permits or letters of authorization that may be necessary. If required, mitigation will be performed according to USFWS recommendations. The USFWS may require a compatibility assessment for any direct wetland impacts that occur on easement land.

If applicable, NWP specific General and/or Regional Conditions prescribed for projects in North Dakota as set forth by the USACE and other applicable BMPs will be used during construction and operation of the Project to protect topsoil, minimize soil erosion and protect adjacent wetland resources from direct and indirect impacts. Practices may include containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with native species.

7.15 Vegetation

7.15.1 Description of Resources

The Project Area is located in the Northern Glaciated Plains ecoregion. Soil and weather conditions in this region promote a transition zone between short and tallgrass prairie species. Although historically the ecoregion was dominated by grasslands, it has been primarily converted to farmland. Drift plains, large glacial lake basins, and shallow river valleys, with level to undulating surfaces and deep soils, provide the basis for crop agriculture. Where the glaciers left heavy deposits of rock, gravel, and sand, grasslands remained generally more intact and have been used primarily for grazing land for livestock. The geologic youth of the ecoregion has left an immature drainage system, and the ecoregion is dotted with substantial numbers of wetland depressions, ranging in size and permanence. There are also sub-regional concentrations of glacial formed permanent lakes. Agriculture, grasslands, wetlands, and water from the general mosaic of land cover for the ecoregion (U.S. Department of the Interior; U.S. Geological Survey 2013).

Table 7.3-1 in Section 7.3 identifies current land use in the Project site based on NLCD information. According to NLCD, the Project Area is dominated by cultivated crops. Pasture/hay land, emergent herbaceous wetlands, open water, and developed, open space represent smaller proportions of the total Project Area (Figure 15) (Fry et al. 2011). The Project Area is located within the Central Black Glaciated Plains Major Land Resource Area (MLRA). MLRAs have been established by the United States Department of Agriculture and are based upon aggregations of geographically associated land resource units and identify nearly homogeneous areas of land use, elevation, topography, climate, water resources, potential natural vegetation, and soils. About three-fourths of the Central Black Glaciated Plains MLRA is dry-farmed cropland and primary crops include small grains such as wheat, durum, and barley; corn; and soy beans.

A Tetra Tech biologist visited the Project Area during the fall of 2012 to assess habitat coverage and land cover. The biologist observed the Project Area from the public right-of-way and did not access private lands. The land cover of the Project Area was consistent with the land cover described by the NLCD and for the ecoregion as a whole and was observed to consist of a mix of agricultural lands used for grain crops, wetlands, developed land (farmsteads), and small tracts of grasslands. A mix of deciduous and coniferous trees planted for windbreaks surround most farmsteads within the Project Area.

7.15.2 Impacts

Impacts to native vegetation are expected to be minimal based on the dominant agricultural land cover of the Project Area.

7.15.3 Mitigative Measures

CWF will implement the following mitigative measures:

- Conduct a pre-construction inventory of existing wetlands and native prairie;
- Work closely with the USFWS and North Dakota Game and Fish Department (NDGFD) during micrositing to minimize impacts on vegetation within the Project Area;
- Develop a management plan to prevent the spread of noxious weeds throughout the Project Area during construction and ongoing operations in accordance with state and county regulations;

CWF will use BMPs during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and revegetating with native species.

7.16 Wildlife

7.16.1 Description of Resources

CWF has been actively assessing the Project Area in accordance with the USFWS's Land Based Wind Energy Guidelines (LBWEGs) tiered assessment program. Tier 1 is an evaluation of alternatives at a landscape level. CWF completed a retroactive landscape assessment since the Project was sited before the LBWEGs were available to wind energy developers. CWF contracted with Tetra Tech, Inc. to complete Tier 2, an evaluation of the site's local resources using desktop level information, and Tier 3, an evaluation of avian and bat use of the site. Information on the existing wildlife in the Project Area and vicinity was obtained during Tetra Tech's Tier 2 site characterization and Tier 3 2012 fall avian point count surveys. Both the Tier 2 and Tier 3 reports are provided in Appendix C.

As a part of the Tier 2 site characterization, a Tetra Tech biologist visited the Project Area to assess habitat coverage and land cover. The land cover of the Project Area was consistent with the land cover described by the NLCD (see Section 7.3) and was observed to consist of a mix of agricultural lands used for grain crops, wetlands, developed land (farmsteads), and small tracts of grasslands. Wildlife in the Project Area and vicinity is expected to reflect the land cover observed and consist of birds, mammals, fish, reptiles, amphibians, and insects, both resident and migratory, which use the Project Area habitat for forage, migratory stopover, breeding, and/or shelter. The results of the Tier 2 site characterization are discussed in more detail in Section 7.17.

Avian Species
The Project Area is located within the Central Flyway, one of the main migratory bird routes. Most birds that move along the Central Flyway travel from Canada through the central states, eventually reaching the tropics of South America via the Gulf of Mexico (USFWS 2013). The Project area also lies within North American Bird Conservation Region (BCR) 11 (Prairie Potholes). According to the North American Bird Conservation Initiative (NABCI), this region

comprises the core of the breeding range of most dabbling duck and several diving duck species and provides critical breeding and migration habitat for over 200 other birds (American Bird Conservancy 2013).

Weekly fixed-point (800-m radius) surveys were performed in the Project Area between September 27 and November 16, 2012 at nine point count locations distributed throughout the Project Area. During the study period, a total of 11,002 birds from 42 species (plus an additional 700 unidentified birds) were observed within the Project Area. Overall avian mean use at the observation points was 153 birds per 20-minute survey (birds/20 min).

Waterfowl, Songbirds, and Waterbirds

A large number of wetlands providing migratory stopover habitat are present within the Project Area. Accordingly, waterfowl exhibited the highest mean use of the species groups observed, and approximately 55 percent of the total birds observed were waterfowl species. Studies of these taxa found low fatalities rates at wind energy facilities even with high mean use (Erickson et al. 2002, Kerns and Kerlinger 2004, Jain 2005). This discrepancy may occur because these species often fly within flocks during daylight hours, which increases their ability to detect the turbines. Based on a review of mean use and estimated fatality rates of goose species at operating wind facilities, a collision model was created that estimated the average turbine collision avoidance rate for geese (Canada and snow geese) was high at 99.93 percent (Fernley et al. 2006). Additionally, the two most commonly observed waterfowl species (Canada goose and mallard) have stable to increasing populations, largely due to their adaptability to changing habitats and human disturbance (Drilling et al. 2002; Mowbray et al. 2002). Given their wide-spread status, high numbers, and stable to increasing populations, population-level impacts are unlikely as a result of any turbine-related mortality that may occur.

Songbirds exhibited the second highest mean use of the Project Area. Red-winged blackbird, common grackle, and unidentified blackbirds were the most commonly observed songbird species. Unidentified blackbirds were likely either red-winged blackbird or common grackle. Given the high mean use of the Project Area by these two species, turbine-related fatalities may occur. However, any fatalities that do occur are unlikely to have population-level impacts due to the species large, stable populations (Rich et al. 2004; Sauer et al. 2008).

Waterbirds exhibited the third highest mean use of the Project Area, a value largely driven by American coot mean use. The biologist observed the majority (96%) of coots swimming or standing on the edge of wetlands. The few coots observed in flight were flying at low altitudes below the rotor-swept height (RSA). American coot mortality has been recorded at other wind energy facilities but at low numbers (Johnson et al. 2002, Anderson et al. 2005, Kerlinger et al. 2006). Given the high number of coots using the Project Area, some turbine-related mortality may occur; however, any fatalities are not expected to have population level impacts due to the species large, stable population (Sauer et al. 2008).

Raptors

Special consideration is often given to raptor species at wind farms because diurnal raptors are generally at higher risk for collision with turbines than are many other avian species (National Wind Coordinating Collaborative [NWCC] 2001). High raptor use has been associated with high raptor mortality at new generation wind farms (Erickson 2007). Conversely, raptor mortality appears to be low when raptor use is low, as defined by Erickson (2007) as less than 1.0 birds/20 min. Based on mean use, the Project would be considered a low risk site for raptor mortality with a group mean use of 0.43 birds/20 min. Additionally, the observed flight behavior or raptors did not indicate high risk of collision mortality.

Listed and Sensitive Species
No federal threatened or endangered species have been observed in the Project Area. During avian surveys, two bald eagles were observed within the Project Area, and one was observed flying through the RSA. The very limited number of collision mortality records for bald eagles at other wind farms indicates that bald eagles will likely be at low risk of collision mortality at the Project Area (Manville 2005, Pearce 2010).

7.16.2 Impacts

Activities such as road construction can destroy or disrupt wildlife habitat and allow for the introduction of unwanted plant species. In areas where disturbance is significant and natural regeneration of onsite plant propagules will not occur, the temporary loss of habitat may be mitigated by reseeding of the affected areas with native prairie plant species. Displaced wildlife will likely relocate to nearby unaffected areas within the Project Area.

Birds have been identified as a group particularly at risk at wind generation facilities because of the potential for collisions with turbines and power lines (Drewitt and Langston 2006, Arnett et al. 2007). Early wind generation facilities had high levels of avian mortality and raptors were found to be particularly at risk (Barclay et al. 2007). Studies conducted at newer wind generation facilities have shown that high levels of collision mortality do not routinely occur, partially due to improved turbine design (Drewitt and Langston 2006; NWCC 2001). However, several factors such as abundance, composition, presence of migration corridors, landscape features, and prey abundance can still contribute to avian mortality at wind farm facilities.

In addition to collision mortality, birds may also be at risk of displacement due to habitat loss or change associated with the presence of the facility structures. A decrease in songbird abundance closer to turbines has been demonstrated in two studies, but the causal mechanisms have not been investigated (Leddy 1999 and Johnson et al. 2000). Research at two sites in North and South Dakota (Shaffer and Johnson 2008) suggests that certain grassland songbird species (2 of 4 studied) may avoid turbines by as much as 200 m, but these results have not been finalized nor verified at additional sites. None of these studies have addressed whether these avoidance effects are temporary (i.e., the birds may habituate to the presence of turbines over time) or permanent. Pearce-Higgins et al. (2012) found little evidence for a post-construction decline for ten species of birds at 18 wind projects in upland habitats in the UK based on data from 1 to 10

years post-construction (more than half of the data was between 1 and 3 years post-construction). However, disturbance related effects were detected during construction.

7.16.3 Mitigative Measures

The following measures will be used, to the extent practicable, to help avoid potential impacts to wildlife in the Project site during selection of the turbine locations and subsequent development and operation:

- Follow the USFWS's LBWEGs to the extent practicable;
- Conduct additional Tier 3 studies within the Project Area, including wetland and native prairie surveys, raptor nest surveys, spring avian point count surveys, crane surveys, and bat acoustic surveys;
- Coordinate with the USFWS regarding Tier 3 studies and protocol;
- Prepare a Bird and Bat Conservation Plan (BBCS) with the input of the USFWS and NDGFD, and implement the plan once complete;
- Minimize permanent impacts on wetlands during design and construction of turbines and associated infrastructure. This will help minimize wildlife impacts (e.g., waterfowl, waterbirds, bats);
- Minimize disturbance of native prairie during design and construction of turbines and associated infrastructure;
- Protect existing trees and shrubs where practicable. If impacts are unavoidable, CWF will replant trees and shrubs in accordance with the Commission's tree and shrub mitigation specifications;
- Re-seed non-cropland and pasture areas with a native seeding mix as recommended by USFWS and NRCS;
- Control noxious weeds in the immediate vicinity of the turbines, access roads, and associated facilities, immediately after construction and periodically for the life of the Project;
- Bury the electrical collection system connecting the turbines to the Project substation underground, if site conditions are favorable;
- Set back Project wind turbines, substations, and buildings at least 0.25 mi from USFWS WPAs; and
- Minimize disturbance of active nests of breeding birds (including raptors) found during Project construction.

CWF is committed to minimizing wildlife impacts within the Project Area. CWF will design the Project to minimize avian impacts by avoiding high use wildlife habitat, using tubular towers to minimize perching, and minimizing infrastructure. CWF continues to consult with the USFWS and NDGFD regarding appropriate mitigation measures for wildlife impacts.

7.17 Rare and Unique Natural Resources

7.17.1 Description of Resources

Federal Listed Species
According to the USFWS, federally listed species known to occur within Stutsman County include: whooping crane (endangered), piping plover (threatened), Sprague's pipit (candidate), and Dakota skipper (candidate). As illustrated in Figure 18, piping plover critical habitat is present within Stutsman County (USFWS 2012a).

The whooping crane (*Grus americana*), a federally endangered species, is a regular spring and fall migrant in North Dakota. In North Dakota, whooping cranes have the potential to occur anywhere suitable feeding and roosting habitat is found; however, 94 percent of all documented whooping crane occurrences have been within a 200-mile corridor adjacent to the Missouri River (CWS and USFWS 2007). According to a whooping crane likelihood of occurrence assessment conducted for the Project and provided in Appendix C, the likelihood of whooping cranes occurring in the Project Area is low. The major factor that contributed to this assessment was the Project area's location outside of the whooping crane migration corridor as shown in Figure 18. The Project area has a slightly higher proportion of suitable wetland habitat within the Project area than the surrounding area. There are no recorded historical observations of whooping cranes within the Project area, as also shown in Figure 18A total of thirteen observations occurred within the thirty five mile buffer area around the Project area. The majority of these observations occurred west of the James River.

The piping plover (*Charadrius melodus*), a federally threatened species, is a small migratory member of the shorebird family. Breeding individuals in the Great Plains population nest along the shores of alkali wetlands and on riverine shores and sandbars, preferably in areas with minimal vegetation (USFWS 1988). Plovers avoid dense vegetation. Nearly all natural lakes used by plovers in North Dakota are alkaline in nature and have salt-encrusted, white beaches that are generally are 10-40 yards wide. In North Dakota, this habitat is found on the Missouri and Yellowstone Rivers (USFWS 2012b). The Project Area is located within the range of the piping plover and this species has been recorded in Stutsman County and critical habitat for the species is located at the Arrowwood National Wildlife Refuge approximately 5.5 miles west of the Project Area. During the site visit, the majority of the wetlands observed within the Project Area were surrounded by dense emergent vegetation and would not provide adequate piping plover breeding habitat. Several wetlands observed from the public road right-of-way were observed to have lowered water levels, resulting in narrow mud beaches with some salt accumulation. These wetlands lack the beach width and substrate associated with high quality piping plover breeding habitat; however, CWF is coordinating with the USFWS to determine if piping plover surveys are warranted.

The Sprague's pipit (*Anthus spraguii*) is a small songbird that is endemic to the Northern Great Plains. This species was recently listed as a candidate species under the Endangered Species Act (ESA). During the breeding season (late April to early September), Sprague's pipits are more

likely to be found in large (> 358 acres) patches of native prairie although they will utilize areas with non-native grasses if the vegetation structure is suitable (e.g., dense cover) and also will breed in lightly grazed rangeland. They are rarely observed in cropland or land in the Conservation Reserve Program (CRP). The loss and fragmentation of native prairie habitat is listed as the primary cause of Sprague's pipit population declines (USFWS 2010). Based on observations made during the site visit and land cover data, the Project Area is dominated by cultivated land, with some small grassland areas. These areas are less than 25acres in size and are unlikely to provide suitable Sprague's pipit habitat (Fry et al. 2011).

High quality native prairie serves as vital habitat for the Dakota skipper (*Hesperia dacotae*), a federal candidate species. The Dakota skipper is classified as a candidate species because, although its historic range once consisted of vast unbroken native prairies in north-central United States and south-central Canada, its current range is now limited to scattered remnants of high quality native prairies in Minnesota, North and South Dakota, and southern Manitoba (USFWS 2012c). The Dakota skipper population has declined due to sensitivity to disturbances, such as grazing and fire, and the loss of native prairie habitat. Based on observations made during the site visit and land cover data, the Project Area is dominated by cultivated land, with some small grassland areas that could potentially provide Dakota skipper habitat.

State Listed Species

At the state level, North Dakota has identified 100 Species of Conservation Priority under the North Dakota Comprehensive Wildlife Conservation Strategy. This list includes 45 avian species, 2 amphibian species, 9 reptile species, 15 mammal species, 22 fish species, and 7 freshwater mussel species. The designation of Species of Conservation Priority describes a species identified as in decline at the national, regional, or state level, or a species whose population status is not well known, but is thought to be in decline in North Dakota (Hagen et al. 2005). Species of Conservation Priority receive special attention from state agencies, but do not require take permits or have other regulatory implications. All of the federally listed species discussed above, with the exception of Dakota skipper, are also Species of Conservation Priority. Tetra Tech received the results of the Natural Heritage Inventory (NHI) query in the form of GIS shapefiles on January 31, 2013. Only two records of Species of Conservation Priority exist within a one-mile radius of the Project Area: common loon (observed in 1961) and pugnose shiner (observed in 1964). Both species were recorded at Spiritwood Lake, which is located to the east of the Project. The common loon occurs at freshwater lakes and rivers and may use the larger wetlands present within the Project Area. The pugnose shiner (a minnow) occurs in clear, moderately flowing waters with aquatic vegetation (Dirk 2012). The pugnose shiner is unlikely to occur within the Project Area. The lack of NHI data for the Project Area cannot be construed to mean that no significant features are present. The absence of data may indicate that the Project Area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

During fall 2012 avian surveys, the mosaic of wetlands present within the Project Area was observed to provide migration stopover and breeding habitat for waterfowl. Several waterfowl and shorebird species are considered Species of Conservation Priority by the NDGFD and may

occur within the Project Area. Other Species of Conservation Priority that may occur within the Project Area are those that have adapted to use disturbed habitats like the row crop fields and shelterbelts present within the Project Area.

Species of Habitat Fragmentation Concern

The USFWS North Dakota Ecological Services Field Office has identified eleven Species of Habitat Fragmentation Concern for the state: Baird's sparrow (*Ammodramus bairdii*), bobolink (*Dolichonyx oryzivorus*), chestnut-collared longspur (*Calcarius ornatus*), grasshopper sparrow (*Ammodramus savannarum*), greater prairie chicken (*Tympanuchus cupido*), greater sage grouse (*Centrocercus urophasianus*), northern harrier (*Circus cyaneus*), sedge wren (*Cistothorus platensis*), sharp-tailed grouse (*Tympanuchus phasianellus*), Sprague's pipit, and upland sandpiper (*Bartramia longicauda*) (USFWS 2012d). With the exception of the greater sage-grouse (range does not include Stutsman County) the Species of Habitat Fragmentation Concern are associated with grassland habitats or wetland habitats. According to the NLCD data, the grassland areas within the Project Area range from less than 10 acres to 24 acres (Fry et al. 2011). No large tracts of grasslands were observed within the Project Area during the November 2012 site visit. Several small areas of grassland were observed within the Project Area; however, identification of native prairie was not possible due to the timing of the site visit outside of the normal growing season. The Project Area was observed to consist of a mosaic of wetlands and farmland. Species of Habitat Fragmentation Concern likely to occur within the Project Area include those species, such as northern harrier and sedge wren, which are known to use a mix of these habitat types.

7.17.2 Impacts

With respect to the whooping crane, the likelihood of occurrence is low due to the Project's location outside of the whooping crane migration corridor, making the probability of whooping cranes occurring at the site low. The two most likely impacts of wind development on whooping cranes are: 1) direct mortality of whooping cranes due to collisions with turbines or other facilities; or 2) whooping cranes' avoidance of the area around the facility.
Wetlands within the Project Area lack the beach width and substrate associated with high quality piping plover breeding habitat, and impacts to piping plover are not anticipated. Based on the land cover observed within the Project Area, impacts to Sprague's pipit and Dakota skipper are not anticipated.

Species of Conservation Priority and Species of Habitat Fragmentation may occur within the Project Area. Impacts to these species are expected to be minimal and reflect potential impacts to wildlife as a whole. Activities such as road construction can destroy or disrupt wildlife habitat and allow for the introduction of unwanted plant species. In areas where disturbance is significant and natural regeneration of onsite plant propagules will not occur, the temporary loss of habitat may be mitigated by reseeding of the affected areas with native prairie plant species. Displaced wildlife will likely relocate to nearby unaffected areas within the Project Area.

7.17.3 Mitigative Measures

In terms of mitigative measures for rare and unique resources, CWF will:

- Coordinate with the USFWS regarding Tier 3 studies and protocol, specifically regarding the need for piping plover studies;
- Prepare a BBCS with the input of the USFWS and NDGFD and implement the plan once complete;
- Re-seed disturbed areas with native seed mix;
- Minimize the construction footprint;
- Bury the electrical collection system connecting the turbines to the Project substation underground, if site conditions are favorable;
- Establish a 0.25-mi setback from USFWS WPAs for Project wind turbines, substations, and buildings;
- Minimize impacts during preconstruction to sensitive areas such as wetlands to the extent possible;
- Prepare a manual in accordance with the BMPs prior to construction, which will then be provided to construction personnel;
- Train construction personnel on all BMPs; and
- Implement speed limits on Project access roads to minimize the potential for striking wildlife.

7.18 Summary of Impacts

Table 7.18-1 provides a detailed summary of the impacts discussed in Section 7 and mitigation that CWF will implement to address these impacts.

Table 7.18-1: Summary of Impacts

Resource	Potential Impact	Mitigation
Demographics	Primarily positive due to increased tax base and infusion of wages, payments to landowners and investors, and expenditures from Project construction and operation. Negative impacts are minor and limited to removal of land from agricultural use for Project facilities.	Wages will be paid and expenditures will be made to local businesses during Project construction. The Project will increase the county's tax base. Lease payments paid to landowners will offset potential financial losses from impacts to agricultural production. Payments to local investors will increase overall community revenue.

Resource	Potential Impact	Mitigation
Land Use and Managed Lands	The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. These impacts could include, but are not limited to, loss of planting opportunity, crop damage, and soil compaction. The Project may potentially interfere with agricultural activities including, maneuvering equipment around structures and aerial spraying. No impacts to human settlement, mining, missile facilities, or school trust lands are anticipated. The Project may potentially impact wetland easements or CRP parcels.	CWF will provide appropriate compensation for lost planting opportunities, crop damage, soil compaction, and damage to drainage tiles. Soils compacted by construction activities will be restored. CWF will coordinate with landowners to site access roads in a manner that preserves existing land uses to the greatest extent practicable. After the Project is constructed, aerial sprayers will need to employ the same flight patterns as used when working adjacent to tree rows, distribution lines, or communication structures. Wind turbines will be sited a minimum of 1,400 ft from occupied residences. If Project facilities will impact wetland easements or CRP parcels, CWF will work with the USFWS,NRCS, and private landowners to minimize impacts.

Resource	Potential Impact	Mitigation
Public Services and Existing infrastructure	Potential construction activities that may disrupt roadways and access. Temporary dewatering of groundwater may be required during construction of the turbine foundations. Slow moving construction vehicles may cause delays on smaller roads, similar to farm equipment during harvest. Tables 4.2-1 and 4.2-2 discuss setback distances for the Project from existing infrastructure. With these setbacks in place, no impacts are anticipated for tower infrastructure occurring in the Project Area. No impacts to telecommunication services and infrastructure are anticipated.	CWF activities may disrupt roadways and access. CWF will develop a construction traffic plan. CWF will accommodate emergency service providers during construction and operations and will include them in the development of a safety plan specific to the site. CWF will seek approval from the FAA for the final turbine layout. CWF will comply with NERC and MISO regulations and any requirements of the Interconnection Agreement. An underground utilities locator company will be contacted prior to construction to locate underground facilities. The final Project layout will avoid interference with any microwave beam path's WCFZ. Impacts on AM, FM, and off-air television broadcasts are not anticipated so specific mitigation measures are not proposed. CWF will be covered under a NPDES permit and SWPPP and will follow the Construction and Environmental Disturbance Requirements as provided by the NDDOH. Operating permits will be acquired from the state, county, and/or township, as necessary.

Resource	Potential Impact	Mitigation
Human Health and Safety	A Phase I ESA will be conducted to identify any RECs. Impacts on the security and safety of local communities will be negligible. Temporary air quality impacts caused by the Project batch plant and construction-vehicle emissions and fugitive dust from construction activities may occur.	As shown in Table 4.2-1 and 4.2-2, CWF will set back wind turbines from all occupied residences, bury collection lines to a depth of approximately 3 ft, and fence off and place warning signs around the Project Substation. Any petroleum waste will be handled and disposed of in accordance with local, state, and federal regulations. Additional handling, storage, and reporting requirements for hazardous material will be covered in association with NDDOH's Construction and Environmental Disturbance Requirements, the NPDES permit required for the Project and the SWPPP. Security measures will be taken to reduce the chance of physical and property damage, as well as personal injury. The Project batch plant will comply with all federal and state air quality standards. CWF will take all necessary measures to minimize fugitive dust emissions.
Sound and Noise	Construction activities, normal operations of the Project, and O&M vehicles for the Project will generate noise. The proximity of sensitive noise receptors (occupied residences and humans) to Project facilities will determine the level of noise perceived.	Impacts to nearby residents and other potentially affected parties in terms of noise will be taken into consideration as part of turbine siting. A noise-analysis will be conducted prior to finalizing the Project layout, CWF will site turbines to meet state and local noise standards. As shown in Table 4.2-1, CWF will set back wind turbines at least 1,400 ft from all occupied residences, which mitigates and minimizes adverse noise impacts from both construction and operation.

Resource	Potential Impact	Mitigation
Cultural and Archaeological Resources	Any ground disturbing activity within the Project Area has the potential to impact known or unknown cultural resources. Possible concerns regarding visual impacts to recorded or unrecorded historic structures and properties may also occur.	CWF conducted a literature search of known cultural resources and archaeological properties within the Project Area. CWF provided the SHPO with the results of the literature search in a letter dated February 11, 2013 (Appendix H). SHPO requested a Class II and Class III survey of the Project Area. These cultural resource field surveys will be conducted in 2013 to confirm that the locations of Project facilities will not impact cultural resources.
Recreational Resources	Impacts to recreational resources will be visual in nature and limited to individuals using public or private property in the Project Area for hiking, hunting, fishing, or nature observation. During construction, the noise from increased vehicle traffic and construction activities may alter the experience of those using recreational areas, such as PLOTS.	To the extent practicable, Project facilities will be placed in a manner to avoid impacts to recreation resources.

Resource	Potential Impact	Mitigation
Visual Resources	The Project will have an effect on the visual quality of the site and in nearby areas, but the aesthetic effect of the Project is based on subjective human response. Shadow flicker may occasionally occur at residences and other buildings in and around the Project Area	Tables 4.2-1 and 4.2-2 discuss setback distances for the Project from existing infrastructure. Turbines will only be illuminated to meet FAA regulations. Existing roads will be used for construction and maintenance where possible. Access roads created for the Project will be located on gentle grades to minimize visible cuts and fills. Temporarily disturbed areas will be reseeded per NRCS recommendations and the Project's site specific BBCS document to blend in with existing vegetation. Shadow flicker modeling of the Project will be used to minimize flicker occurrences at residences in the vicinity.

Resource	Potential Impact	Mitigation
Land Based Economies	No impacts are anticipated to livestock health and safety due to the construction or operation of the Project. Except for the physical locations of the turbines and access roads, the land surrounding the facility will be available for grazing and other agricultural activities. The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Actual impacts to agriculture production will be determined once turbine and road locations are finalized. Depending upon the turbine type selected, 52 to 69 acres of land may be permanently disturbed for the Project. Since a majority of the woodlands on the Project site are associated with homesteads and windbreaks, minimal impacts are anticipated.	Only land for turbines, substation, O&M building, and access roads will be unavailable for crop production or grazing during the life of the Project. CWF will work with the landowners to identify locations of drainage tiles and will minimize interference with drainage tile systems, where possible. Areas disturbed during construction will be repaired and restored to preconstruction contours to the extent practicable so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion. If unavoidable impacts to woodlands arise, then individual trees will be replaced at a ratio of 2:1 and plantings will be monitored for three years per Commission requirements.

Resource	Potential Impact	Mitigation
Soils, Geology and Ground Water	The impact to soils in the Project site will be limited to areas removed from agricultural production, either for turbines and associated structures, or for road construction. The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Grading may be required for roadway construction. CWF will avoid wetland areas to the extent possible, so the potential for soil loss due to erosion or impacts on hydric soils, such as compaction, is low. Impacts to groundwater resources are not anticipated as water supply needs will be quite limited. It is probable that O&M water requirements will be satisfied with a single domestic-sized water well.	Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. CWF will follow the Construction and Environmental Disturbance Requirements as provided by the NDDOH. Each turbine will be located a minimum distance of 1,400 ft from occupied residences, thereby minimizing the risk of impacts on private wells in the area. In the event that subsurface blasting is required, a blasting plan will be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Any dewatering required during construction will be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential impacts.
Surface Water and Floodplains	Project facilities will be designed to avoid impacts on surface water resources to the extent practicable. Wind turbines will be sited on uplands to avoid surface water resources in the lower elevations to the extent practicable. Project facilities, such as underground electrical collector lines, access roads, turbine pads, and the O&M building, will impact surface water runoff within the Project Area. These impacts are expected to be minimal.	Access roads constructed adjacent to wetlands or intermittent streams and drainageways will be designed in a manner so runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. CWF will follow the Construction and Environmental Disturbance Requirements as provided by the NDDOH.

Resource	Potential Impact	Mitigation
Wetlands	The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. Wetland delineations will be conducted in 2013 using the USACE standard methodology. In areas where the USFWS holds wetland easements CWF will conduct wetland delineations in coordination with USFWS guidance. Wetland impacts will be determined following the wetland delineations. Wetland delineations will determine whether or not wetlands in the Project Area fall under the jurisdiction of USACE, as defined by Section 404 of the Clean Water Act. Though a final Project layout has not been determined, CWF does not anticipate impacts to basins within wetland easements, as discussed in Section 7.3.	CWF will avoid impacts to wetlands to the extent possible. If impacts to USACE jurisdictional wetlands are unavoidable, then a Section 404 and 401 permit application will be submitted to USACE and State of North Dakota, respectively. Permanent impacts to jurisdictional wetlands and waters will be mitigated according to USACE requirements. It is anticipated that any impacts to USACE jurisdictional waters will be temporary and as a result, will not require compensatory mitigation. Construction activities and the Project facilities will be designed to avoid wetlands under easement with the USFWS. In the event that USFWS wetland easement impacts are unavoidable CWF will coordinate with the USFWS. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. CWF will follow the Construction and Environmental Disturbance Requirements as provided by the NDDOH.

Resource	Potential Impact	Mitigation
Vegetation	The permanent site layout has not been determined but Table 5.1-1 estimates the Project's impacts based on a preliminary layout. The amount of vegetation that will be permanently removed as a result of the Project will be determined once a site layout is finalized. During the construction of the Project, areas will be temporarily disturbed for contractor staging areas and installation of underground collection lines.	If impacts to individual trees and shrubs cannot be avoided, these resources will be mitigated at a ratio of 2:1 and new plantings will be monitored for three years in accordance with the Commission's tree and shrub mitigation specifications. Construction activities will be conducted under the requirements of the NPDES permit and SWPPP for the Project. CWF will follow the Construction and Environmental Disturbance Requirements as provided by the NDDOH. Temporarily disturbed areas will be reseeded per NRCS recommendations to blend with existing vegetation and prevent the spread of noxious weeds.
Wildlife	The Project may result in direct and indirect impacts to birds and bats. Direct impacts include strike mortality from turbine blades and related infrastructure, electrocution from overhead collector lines, and loss of habitat. Indirect impacts may include displacement of birds and bats from their habitat, site avoidance, and behavioral modification.	CWF has conducted and is conducting biological assessments (discussed in Section 7.16) to aid in detailed placement of turbines, roads, and associated facilities to avoid or minimize impacts to wildlife and habitat. These biological assessments are designed to follow the USFWS LBWEGs tiered analysis of the site. Mitigative measures include an BBCS Document, post-construction bird and bat mortality monitoring, revegetation, tree replacement, avoiding or minimizing disturbance to individual wetlands or drainage systems, avoiding and minimizing impacts to native prairie, and maintaining appropriate water and soil conservation practices.

Resource	Potential Impact	Mitigation
Rare and Unique Natural Resources	Potential affects to rare and unique natural resources may be direct (e.g., collision mortality) or indirect (e.g., avoidance of the site resulting in species seeking alternate habitat). Refer to Section 7.16.3 for a discussion of impacts to rare and unique natural resources.	On behalf of CWF, Tetra Tech has conducted and will continue to conduct raptor surveys, avian migration surveys, acoustic bat monitoring, and avian point count surveys. Information from these surveys will be used to identify potential impacts from the Project and aid in finalizing the Project layout. Refer to Section 7.15.3 for mitigation measures CWF is implementing to minimize impacts to all wildlife and habitat, including development of a BBCS document.

8.0 Public Coordination

Coordinating and sharing information with landowners, community members, agencies and government officials is an important aspect of the Project's successful development.

CWF met with Stutsman County officials to introduce the Project, discuss permitting requirements, and answer questions. CWF has also coordinated with relevant state and federal agencies, including but not limited to the NDGFD and USFWS. CWF met with officials from the North Dakota state level government on February 15, 2013.

On February 02, 2013, CWF sent letters introducing and requesting feedback on the Project to the following agencies and stakeholders (Appendix G):

- North Dakota Aeronautics Commission
- North Dakota Attorney General
- North Dakota Department of Agriculture
- North Dakota Department of Health
- North Dakota Department of Human Services
- North Dakota Department of Labor
- North Dakota Department of Career and Technical Education
- North Dakota Department of Commerce
- North Dakota Energy Development Impact Office
- North Dakota Game and Fish Department
- North Dakota Industrial Commission
- North Dakota Governor's Office
- North Dakota Highway Department
- North Dakota Indian Affairs Commission
- State Historical Society of North Dakota
- Job Service of North Dakota
- North Dakota Land Department
- North Dakota Parks and Recreation Department
- North Dakota Soil Conservation Committee, NDSU Extension Service
- North Dakota State Water Commission
- United States Department of Defense
- United States Corps of Engineers
- Federal Aviation Administration
- North Dakota Transmission Authority
- North Dakota Pipeline Authority
- Stutsman County Board of Commissioners
- North Dakota Economic Development and Finance Division

- North Dakota Geological Survey
- North Dakota Division of Community Services
- Minot Air Force Base

The responses to CWF's agency notification letters are included in Appendix G. On February 11, 2013, CWF provided the results of the Class I Cultural Resource Literature Search to the SHPO. In addition, CWF has been in long term coordination with the USFWS regarding the Project including face-to-face meetings and regular conference calls on Project progress this coordination including meeting minutes are included in Appendix H. CWF will keep stakeholders, landowners, and agencies informed of the Project's progress. Coordination will continue with relevant agencies and landowners throughout the development phase of the Project.

9.0 Identification of Potential Permits/Approvals

Agency	Approval
US Army Corp of Engineers	Section 404 Permit for wetland impacts.
US Fish and Wildlife Service	Compatibility Analysis, ROW Permit, and Special Use Permit (SUP). If constructing in a wetland basin within a wetland easement, compatibility analysis is required. A ROW permit may be required for permanent disturbance in wetland easements and a SUP is required for temporary disturbance in wetland easements.
Federal Aviation Administration	Determinations of No Hazard
U.S. Environmental Protection Agency (USEPA)	Spill Prevention Control and Countermeasure (SPCC) Plan
North Dakota Public Service Commission	Certificate of Site Compatibility
North Dakota Dept. of Game and Fish	Review and Coordination
North Dakota Dept. of Heath (NDDOH)	Section 401 Certification
	NPDES General Permit (Construction)
North Dakota Department of Transportation (NDDOT)	Road Approach/Access Permit
Utility Permit / Risk Management Documents	Required to install utilities within state owned ROW.
North Dakota Highway Patrol	Over-height/Over-weight/Over-length Permit
State Historic Preservation Office (SHPO)	Review and Coordination
North Dakota State Water Commission (NDSWC)	Dewatering Permit
Stutsman County *	Conditional Use Permit (Wind Farm)

Agency	Approval
	Floodplain Development Permit
	Driveway Entrance Permit
	Building Permit
Ashland Township*	Building Permit
Fried Township*	Building Permit
Bloom Township*	Building Permit
*CWF will enter into Road Maintenance Agreements with Stutsman County and any applicable townships	

10.0 Factors Considered

The Siting Act lists eleven factors to be considered in the Commission's evaluation and designation of the Project (see NDCC Section 49-22-09). These eleven factors are discussed below.

10.1 Public Health and Welfare, Natural Resources, and the Environment

Section 7 in this application discusses the research and investigations conducted relating to the Project's potential effects on public health and welfare, natural resources, and the environment. These effects and the proposed mitigation to minimize these effects are summarized in Section 7.18.

10.2 Technologies to Minimize Adverse Environmental Effects

CWF will use the best available technologies to minimize adverse environmental effects. Current wind turbine technologies optimize wind and land resources, while minimizing adverse environmental effects. CWF will use enclosed turbine towers rather than exposed lattice towers to minimize bird perching and nesting. Wind turbines and permanent meteorological towers will not be equipped with guy wires. Turbine blades will be feathered in high wind speeds to prevent excessive rotation.

10.3 Potential for Beneficial Uses of Waste Energy

This factor is not applicable to the Project.

10.4 Unavoidable Adverse Environmental Effects

Unavoidable adverse environmental effects from the Project include visual impacts, impacts associated with ground disturbance and installation of wind energy facilities, and impacts associated with avian and bat species. CWF has taken care to select a site and energy generation type to ensure these impacts will be minimal and has instituted mitigation measures where appropriate. The visual character of the site will be changed due to the construction of the Project; these impacts will be based on subjective human

responses. CWF will minimize the impact through siting, minimal lighting and uniform color and design of the Project's facilities. Unavoidable adverse environmental effects for the Project associated with the construction and permanent placement of Project facilities will include minimal impacts to vegetation, agricultural practices, wetlands, surface waters, and soils. The final layout has not been determined but Table 5.1-1 estimates the Project's temporary and permanent impacts based on a preliminary layout. CWF has detailed mitigation measures for the associated impacts and has outlined them in the appropriate sections of this Application. Impacts to avian and bat species may include avoidance as well as strikes from wind turbines causing injury or mortality. No endangered or threatened bat or bird species are anticipated to be impacted by the Project and CWF will implement bird and bat conservation strategies developed using the USFWS LBWEGs to ensure minimization and mitigation of these impacts.

10.5 Alternatives to the Proposed Site

After considering alternative sites for wind energy project development, CWF chose the proposed site for the Project because of its multitude of favorable site characteristics, including but not limited to a largely supportive landowner population, a strong wind resource profile, a feasible electrical interconnection option and minimal impacts to the natural environment when compared with other potential projects. As discussed in Section 2.2, CWF also considered a market analysis and environmental comparison of various renewable energy generation sources (including wind, solar, biomass, hydropower, etc.). CWF believes wind energy is the most cost-effective and beneficial option and that the proposed site is the best viable alternative.

10.6 Irreversible and Irretrievable Commitment of Natural Resources

With a renewable energy project like the one being proposed herein, there are relatively few irreversible and irretrievable commitments of natural resources. In the case of the Project, construction-related activities are expected to be the primary source of the irreversible and irretrievable commitment of natural resources. Aggregate resources, concrete, steel, and hydrocarbon fuel will be used as construction materials and resources. The Project's access roads will consist of aggregate (i.e. gravel) and CWF will use concrete for facility foundations, including turbine foundations. CWF anticipates recovering some portion of the aggregate used for the roads and foundation but not all of it. Each turbine itself is constructed primarily of steel. A majority of the steel used will be recoverable. Construction machinery and delivery vehicles will use hydrocarbon fuels. Once expended these hydrocarbons will not be recoverable.

10.7 Direct and Indirect Economic Impacts

Removing land from agricultural production for the life of the Project (due to the land's conversion to turbine sites, access roads, and other Project facilities) results in a direct economic impact. The final layout for the Project has not yet been determined, however Table 5.1-1 estimates the Project's temporary and permanent impacts based on a preliminary layout. In general, the agricultural areas surrounding each turbine will continue to be farmed or grazed for the life of the Project. Landowners will be directly compensated for the land occupied by the wind turbines and associated facilities. In addition to facility payments, all landowners who participate in the Project will receive a revenue-based per acre payment with an established minimum for landowners with relatively small acreages. As discussed in Section 3.6, Courtenay Wind Farmers, LLC and the Courtenay Community Fund also provide opportunities for direct benefits to local economies and landowners. There will also be a few years of greater agricultural disturbance associated with construction and compaction from construction. CWF will compensate landowners for crops lost directly from the movement of construction equipment or indirectly from reduced yields associated with compaction.

Shorter-term economic benefits include wages and salaries paid to local hires, which will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county and the state by circulation and recirculation of dollars paid out by CWF as business expenditures and state and local taxes. Expenditures will be made for equipment, energy, fuel, operating supplies, and other products and services, which will benefit businesses in the county and the state.

The Project will provide long-term benefits to Stutsman County's tax base, which will improve the local economy (See Section 3.6). The development of wind energy in this region can play an important role in diversifying and strengthening the economic base of east-central North Dakota. Additional revenues are expected from property and income taxes. Continuing to establish North Dakota as a producer of renewable energy sources may spur the development of related businesses in the area, which will contribute to the economic growth in the region.

10.8 Existing Development Plans of the State, Local Government and Private Entities at or in the Vicinity of the Site

No conflicts are anticipated with existing state and local government or private entities' development plans. On various occasions, CWF met with Stutsman County and North Dakota officials regarding the Project. No issues related to existing development plans were raised at those meetings.

10.9 Effect of Site on Cultural Resources

As discussed in Section 7.7 CWF completed a literature search of known cultural and archaeological resources within the Project Area. Additionally, Project-specific field surveys for cultural resources will take place during spring 2013. Sensitive cultural resources found within the Project Area will be avoided during development of the final Project layout. Furthermore, CWF and its consultant are consulting with SHPO regarding potential sensitive cultural and historic properties, and will prepare an Unanticipated Discoveries Plan.

10.10 Effect of Site on Areas Unique Due to Biological Wealth or Because They Are Habitat for Rare and Endangered Species

The impact of the Project on wildlife is expected to be minimal. There is potential for avian and bat collisions with turbines and meteorological towers. The site will be designed to minimize impacts to these species. Direct impacts to unique, or Federally Threatened or Endangered species are unlikely. CWF has sited the Project to avoid known occurrences of these species and their associated habitat. CWF is implementing measures to avoid and minimize effects on biological resources potentially caused by the Project including the development of a BBCS in accordance with the USFWS LBWEGs.

Biological and habitat resources that may be impacted by the Project include wetlands, native plant communities and wildlife. CWF will seek to avoid and minimize impacts on these resources through additional studies, including wetland delineations and pre-construction biological surveys, as well as the mitigation measures detailed in Sections 7.14, 7.15, 7.16, and 7.17.

10.11 Problems Raised by Federal or State Agencies and Local Entities

CWF contacted various agencies to request their comments on the Project. The subsections below offer a brief summary of the agencies' comments. The agency response letters are included in Appendix H.

10.11.1 U.S. Fish and Wildlife Service

Coordination between CWF and the USFWS began in 2010 when CWF submitted a request for the USFWS's environmental review of the Project Area. The USFWS responded in a letter dated March 18, 2011. In the letter, the USFWS recommended comparing several alternative sites before selecting a final site, in order to avoid and minimize impacts to wildlife. The USFWS indicated that portions of the Project Area may impact migratory birds. They also discussed the presence of USFWS easements in the Project Area, and recommended further coordination on these matters. After receiving the letter, CWF scheduled an in-person meeting with staff from the U.S. Fish and Wildlife Service's Bismarck Office on April 26, 2011. The April 2011 meeting provided a more detailed discussion of the Project's environmental characteristics and potential impacts. The minutes from the April 2011 meeting show specific discussions regarding wildlife, easements, and USFWS's LBWEGs, which were in draft form at the time. Another in-person meeting occurred on February 22, 2013, with representatives from CWF, USFWS, and Tetra Tech (CWF's environmental consultant) at USFWS's Bismarck Office. The February 2013 meeting served the purpose of continued coordination between CWF and USFWS, including discussion of how the Project is incorporating USFWS's voluntary LBWEGs (which are now finalized), including a tiered assessment of the Project. CWF explained how it followed USFWS's recommendation to evaluate multiple potential project sites from a biological resource perspective. CWF chose the Project Area after comparing multiple sites' biological resources and interconnection feasibilities. USFWS also discussed the presence of wetland easements in the Project Area, which will be a matter of continued discussion. CWF will continue to coordinate with environmental consultants and the USFWS throughout the Project's development.

10.11.2 Federal Aviation Administration

CWF received the FAA determinations of no hazard for its preliminary site layout in March 2013.

10.11.3 North Dakota Game and Fish Department

In a letter dated February 27, 2013, the NDGFD stated that it does not believe the Project will have any significant adverse effects on wildlife or wildlife habitat provided certain recommendations are implemented as appropriate and disturbed areas are reclaimed to pre-project conditions. The recommendations listed include marking overhead lines when placed over perennial streams or sited in close proximity to large wetland complexes. The department's review of the National Wetland Inventory indicated various wetlands within the Project Area. The department recommended minimizing impacts to wetlands and maintaining existing drainage patterns.

10.11.4 State Historical Society of North Dakota

The response letter from SHPO recommended a Class II survey by a permitted architectural historian for the standing structures in the visual Area of Potential Effect and Class III survey of those found to be fifty years of age or older by a permitted architectural historian. It also indicated that Class III (pedestrian) survey will be warranted for all areas directly impacted by the Project, including crane paths, access roads, transmission lines and turbine pads. The letter also indicated that there is potential for unrecorded and recorded cultural resource properties in a variety of physiographic settings in the overall Project Area.

10.11.5 North Dakota Aeronautics Commission

In an e-mail, the North Dakota Aeronautics Commission indicated that the Project review would be a priority for the commission's airport planner. The e-mail also indicated that CWF should assume that no issues were found if no further correspondence was received by March 01, 2013. No further correspondence was received by that date.

10.11.6 North Dakota Department of Health

The NDDOH believes that environmental impacts from the proposed construction will be minor and can be controlled by proper construction methods. The department owns no land in or adjacent to the Project, nor does it have any projects scheduled in the area. It also stated that the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.

10.11.7 North Dakota Parks and Recreation

The NDPRD reviewed the Project. It indicated that the Project does not affect state park lands that it manages but may affect two state Land and Water Conservation Fund sites that it manages. Its review of the North Dakota Natural Heritage biological conservation database also identified several plants, animals, and ecological community occurrences within or adjacent to the Project Area. See Appendix H for specifics.

10.11.8 U.S. Army Corps of Engineers

In a letter dated February 6, 2013, the USACE indicated that a Department of the Army permit may be required for all or part of the Project. The Corps of Engineers requested further information to fully evaluate the Project via a permit application. CWF will submit the permit application when the Project is closer to being construction ready.

10.11.9 U.S. Department of Defense

The results of the Department of Defense's review indicated that the Project will impact training conducted in military operation area Devils Lake East and military training route IR-679. The Department

of Defense recommended contacting the 5 OSS/A-3C, Minot Air Force Base, North Dakota at 701-723-2967. CWF contacted Minot Air Force Base through telephone and written correspondence. The telephone discussion indicated that the Project will not impact training at Devils Lake East or military training route IR-679 if the Project's facilities are less than five hundred feet in height. Any written response or review from the Minot Air Force Base will be provided to the Commission in a timely manner.

10.11.10 National Telecommunications and Information Administration

The National Telecommunications and Information Administration provided the preliminary plans for CWF to the federal agencies represented in the Interdepartment Radio Advisory Committee. After a forty-five day period of review, no federal agencies identified concerns regarding blockage of their radio frequency transmissions.

11.0 Qualifications of Contributors

Contributor	Qualifications
Betsy Engelking Vice President Geronimo Energy, LLC	Betsy Engelking is the Vice President of Geronimo Energy, LLC. Since joining Geronimo in January 2012, Betsy has overseen the restructuring of the development group to streamline the completion of Geronimo's 2,000+ MW wind project pipeline. Betsy also provides input on Geronimo's commercial activities, including proposal drafting, pricing development and PPA negotiation. From 2004-2012 Betsy was Director of Resource Planning for Xcel Energy's Northern States Power Company Minnesota and Wisconsin operating companies. Betsy guided the development of Xcel's long-range Resource Plans, including its Renewable Energy Plan, and directed the acquisition process for all renewable and non-renewable generating resources. Betsy also served as one of Xcel's representatives on its Renewable Development Fund Board. Between 1998 and 2004, Betsy held a similar position with Great River Energy, a G&T cooperative serving 28 rural distribution cooperatives in Minnesota. Betsy served on the staff of the Minnesota Public Utilities Commission from 1988-1998, where she advised the Commission on complex matters related to utility rates, energy efficiency programs, resource plans and energy policy. Betsy was instrumental in developing Minnesota's early renewable energy and energy efficiency policy, and chaired the Commission's work group on Competition and the Electric Industry. Betsy also served as staff co-chair of the NARUC Committee on Energy Resources and the Environment, and participated in a USAID program to educate the State Electricity Board in India on economic regulation of electricity. College of William and Mary in Virginia, B.S., 1982, Biology University of Minnesota, MBA, 1986, Finance

Contributor	Qualifications
Patrick Smith Director of Environmental Services Geronimo Energy, LLC	Patrick Smith has an undergraduate degree in Anthropology from the University of Minnesota, Morris, and a master's degree in Urban and Regional Planning with an emphasis in Environmental Planning from the University of Minnesota's Humphrey Institute for Public Affairs. In his role at Geronimo, Patrick oversees the design and regulatory work for Geronimo's projects. He has coordinated the environmental review for over 1,000 MW of wind energy development. Patrick's past experience includes community development, learning research, and human/natural resource interaction. University of Minnesota-Morris, B.A., 2004, Anthropology University of Minnesota-Twin Cities, Master's of Urban and Regional Planning, Environmental Planning
Justin E. Pickar Director of Development Geronimo Energy, LLC	Justin Pickar joined Geronimo in 2008 after consulting with farmers in his hometown about the benefits of wind energy. His current role with Geronimo is Director of Development. He manages a team of Project Managers and their development activities in projects throughout the Midwest. Previous to Geronimo Justin provided corporate development support to businesses ranging in size from Fortunate 500 to five employees, eventually starting and managing his own consulting firm, EHFAR, LLC, assisting small business in the areas of development, marketing, and public relations. Justin's pride is in his hometown, Wimbledon, North Dakota and in his rural, agricultural, roots. Minnesota State University-Moorhead, B.S., 1998, Mass Communications, Public Relations & Advertising
Jay Hesse Project Manager Geronimo Energy, LLC	Jay Hesse manages Geronimo's North Dakota regional offices and develops renewable energy projects in North Dakota and South Dakota, including CWF. He serves as the first point of contact for landowners and community groups. Jay's background is in business consulting, sales, and financial management. Saint Cloud State University, B.S., 1999
Cody Jenson GIS Specialist Geronimo Energy, LLC	Cody Jenson joined Geronimo Energy in 2012 after a diverse career in providing mapping and geographic analysis. Prior to joining Geronimo, Cody worked in similar positions at the U.S. Geological Survey's Upper Midwest Environmental Sciences Center (UMESC), Garmin International, and Xcel Energy. Saint Mary's University of Minnesota, M.S., Current, Geographic Information Systems University of Wisconsin-La Crosse, B.A., 2007, Geography and Geographic Information Systems

Contributor	Qualifications
Michael Morris Meteorologist Geronimo Energy, LLC	Michael Morris is an experienced renewable energy meteorologist whose primary duty is siting and energy assessment of wind projects. He has supported the development, construction, and operation of nearly 3,000 megawatts of wind capacity across the United States. Michael has previously held similar positions at First Wind and Noble Environmental Power. University of Oklahoma, B.S., 2006, Meteorology University of Oklahoma, M.S., 2008, Meteorology
Heather Wayne Associate Geronimo Energy, LLC	Heather Wayne has six years of experience in renewable energy, including land acquisition, real estate, and environmental work. She joined Geronimo Energy's dynamic team in 2009 after working for Clear Wind, LLC development community wind farms in Minnesota and the Dakotas. Heather also has experience doing biological research for the National Park Service, technical writing and interpreting complex scientific information for wide audiences, environmental testing, and food safety. Saint Olaf College, B.A., 2004, Environmental Studies
Mollie Smith Attorney Fredrikson & Byron, P.A.	Mollie Smith is a shareholder in Fredrikson & Byron's Transmission, Energy and Condemnation & Eminent Domain Groups. She assists clients with wind farm, transmission line, and pipeline permitting matters, as well as condemnation/eminent domain matters. University of Minnesota Law School, J.D., 2004 Colorado State University, M.A., 2000 Northern State University, B.A., 1997
Kim Gorman, GISP Senior Project Manager/GIS Specialist Tetra Tech, Inc.	Kim Gorman is a technical expert and regulatory strategist with over sixteen years of professional consulting experience in the natural resource and environmental fields. She has extensive project management and technical support experience on projects including National Environmental Policy Act (NEPA) analysis and compliance with various lead and cooperating agencies; renewable energy permitting, environmental due diligence, environmental compliance and siting; electrical transmission line permitting; and Geographic Information Systems (GIS) analysis. University of Minnesota – Twin Cities, Master's of Geographic Information Systems (MGIS), 2008 University of Minnesota – Twin Cities, B.S., 1995, Biology

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Karl Kosciuch Senior Biologist Tetra Tech, Inc.	Dr. Karl Kosciuch has worked at the intersection of wind energy and wildlife issues for over 6 years. He has served as lead biologist for over 20 wind energy projects throughout the Midwest, and is knowledgeable about key issues involving whooping crane, lesser prairie-chicken, eagles, and bats. He is experienced with demographic, statistical, and meta-analytic models and effectively communicates results from these models to a wide variety of audience members through the use of non-technical language and concepts. Kansas State University, Ph.D., 2006, Biology Texas A&M University, M.S., 2002, Wildlife and Fisheries Sciences
Kate Schindler Biologist Tetra Tech, Inc.	Kate Schindler is a professional biologist with five years of environmental consulting experience. With an educational background in wildlife biology, Kate has conducted, designed, and overseen numerous wildlife surveys for wind development and energy transmission projects. She is skilled in the quantitative analysis of biological data and has prepared comprehensive risk assessments for species of concern. University of Wisconsin – Stevens Point, M.S., 2008, Natural Resource Management St. Olaf College, B.S., 2002, Biology

12.0 References

Abel, P.L., A. Gulsvig, D.L. Johnson, and J. Seaholm. "United States Department of Agriculture, Natural Resources Conservation Service, Soil Data Mart." *Soil Survey of Stutsman County, North Dakota.* 1990. http://soildatamart.nrcs.usda.gov/manuscripts/ND093/0/stutsman.pdf (accessed March 29, 2013).

American Bird Conservancy. 2013. BCR 11 – Prairie Potholes. Available online at http://www.abcbirds.org/conservationissues/habitats/BCR/potholes.html.

American Medical Association. *Effects of Electric and Magnetic Fields.* Report of the American Medical Association (AMA), Chicago: Council on Scientific Affairs, 1994.

American Physical Society. "Power Line Fields and Public Health." *APS Physics.* April 15, 2005. http://www.aps.org/policy/statements/95_2.cfm (accessed March 2013, 29).

Anderson, R., J. Tom, N. Neumann, W.P. Erickson, M.D. Strickland, M. Bourasse, K.J. Bay, and K.J. Sernka. 2005. Avian monitoring and risk assessment at the San Gorgonio Wind Resource Area. Technical report prepared by State Energy Resources Conservation and Development Commission and Western EcoSystems Technology, Inc. for National Renewable Energy Laboratory. Golden, CO.

Arnett, E. B., D. B. Inkley, D. H. Johnson, L. P. Larking, S. Manes, A. M. Manville, J. R. Mason, M. L. Morrison, M. D. Strickland, and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland, USA.

Barclay, R. M., E. F. Baerwald, and J. C. Gruver. 2007. Variation in bat and bird fatalities at wind energy facilities: assessing the effects of rotor size and tower height. Can. J. Zool. 85:381-387.

Bickel, Dale. *FM, TV, & DTV Propagations Curves Calculations (FCC) USA.* June 2003. http://transition.fcc.gov/mb/audio/bickel/curves.html (accessed March 29, 2013).

Canadian Wildlife Service (CWS) and United States Fish and Wildlife Service (USFWS). 2007. International recovery plan for the whooping crane. Ottawa: Recover of the Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, NM.

Dirk, C.N.G. 2012. North Dakota Animal Species of Concern. [Unpublished list]. North Dakota Natural Heritage Program, Bismarck. 11 pp.

Drewitt, A.L. and R.H. Langston. 2006. Assessing the impacts of wind farms on birds. Ibis 148:29-42.

Drilling, N., R. Titman, and F. McKinney. 2002. Mallard (*Anas platyrhynchos*). *In* The Birds of North America, No. 658 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Eastern Interconnection Planning Collaborative. "Phase 2 Report: DOE Draft - Part 1; Interregional Transmission Development and Analysis for Three Stakeholder Selected Scenarios." *Eastern Interconnect Planning Collaborative.* December 22, 2012. http://eipconline.com/uploads/20130103_Phase2Report_Part1_Final.pdf (accessed March 29, 2013).

EcoNorthwest. "Economic Impacts of Wind Power in Kittitas County, Final Report." A Report for the Phoenix Economic Development Group, Portland, 2002.

Erickson, W.P., G.D. Johnson, D.P. Young, Jr., M.D. Strickland, R.E. Good, M. Bourassa, and K. Bay. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting and mortality information from proposed and existing wind developments. Bonneville Power Administration, Portland, Oregon.

Erickson, W.P. 2007. Summary of methods and results for prediction and estimation of impacts and risk. Presented at NWCC Probability of Impact Workshop, 13 November 2007, Golden, CO.

Federal Emergency Management Agency. "FEMA Map Service Center." https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1, 2013.

Fernley, J., S. Lowther, and P. Whifield. 2006. A review of goose collisions at operating wind farms and estimation of the goose avoidance rate. A report by West Coast Energy Developments, Ltd., Hyder Consulting, and Natural Research, Ltd.

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J. 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, *PE&RS*, Vol. 77(9):858-864.

Google. "Google's Green PPAs: What, How, Why." Vers. 2. *The Big Picture -Google Green.* April 29, 2011. http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/green/pdfs/renewable-energy.pdf (accessed March 29, 2013).

Hagen, S.K., P.T. Isakson, and S.R. Dyke. 2005. North Dakota Comprehensive Wildlife Conservation Strategy. North Dakota Game and Fish Department. Bismarck, ND. 454 pp. Available online at: http://www.gf.nd.gov/conservation/cwcs.html

Heath Jr., M.D., Clark W. "Electromagnetic field exposure and cancer: A review of epidemiologic evidence." *CA: A Cancer Journal for Clinicians* 46 (1996): 29–44.

Hoen, Ben. *Impacts of Windmill Visibility of Property Values in Madison County, New York.* Hudson: Bard Center for Environmental Policy, 2006.

Hoen, Ben, Ryan Wiser, Peter Cappers, Mark Thayer, and Gautam Sethi. "The Impact of Wind Power Projects on Residentail Property Values in the Unites States: A Multi-Site Hedonic Analysis." *Environmental Energy Technologies Division.* December 2009. http://eetd.lbl.gov/ea/ems/reports/lbnl-2829e.pdf (accessed March 29, 2013).

Huxel, C.J. and L.R. Petri. Geology and ground water resources of Stutsman County, North Dakota, Part III: Ground water and its chemical quality. Available online at: http://www.swc.state.nd.us/4dlink9/4dcgi/GetSubContentPDF/PB-351/Stutsman_Part_3.pdf

Jain, A.A. 2005. Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm. Iowa State University.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Sheperd, D. F. Sheperd, and S. A. Sarappo. 2002. Collision mortality of local and migrant birds at a large-scale wind-power development on Buffalo Ridge, North Dakota. Wildlife Society Bulletin 30:879-887.

Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. 2006. Post construction avian and bat fatality monitoring study for the High Winds wind power project. Solano County, California: Two Year Report. Prepared for High Winds, LLC, FPL Energy.

Kerns, J. and P. Kerlinger. 2004. A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia. Annual Report for 2003. FPL Energy and Mountaineer Wind Energy Center Technical Review Committee.

Leddy, K.L., K.F. Higgins, and D.E. Naugle. 1999. Effects of wind turbines on upland nesting birds in CRP grasslands. Wilson Bulletin 111:100-104.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd and D. A. Shepherd. 2000. Avian monitoring studies at the Buffalo Ridge Wind Resource Area, North Dakota: results of a 4-year study. Technical Report prepared for Northern States Power Co., Minneapolis, MN. 212pp.

Manville, A. M. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science – next steps toward mitigation. Available online at: http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/pdfs/1051-1064.pdf

Manz, Lorraine A., and Robert F. Biek. "Geology of the Jamestown Area." *North Dakota Industrial Commission, Department of Mineral Resources.* 2004. https://www.dmr.nd.gov/ndgs/Publication_List/pdf/geoinv/GI_5.pdf (accessed March 29, 2013).

Mowbray, T.B., Ely C.R., Sedinger J.S., and Trost R.E. 2002. Canada goose (Branta canadensis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

MISO. "Multi Value Project Portfolio; Results and Analyses." *Miso Energy.* January 10, 2012. https://www.misoenergy.org/Library/Repository/Study/Candidate%20MVP%20Analysis/MVP%20Portfolio%20Analysis%20Full%20Report.pdf (accessed March 29, 2013).

National Institute of Environmental Health Sciences, National Institutes of Health. "Electric and Magnetic Fields Associated with the Use of Electric Power. Questions and Answers." *National Institute of Environmentall Health Sciences.* June 2002. http://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf (accessed March 29, 2013).

National Wind Coordinating Committee (NWCC), 2001. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Source of Avian Collision Mortality in the United States. Available online at http://www.nationalwind.org/publications/wildlife/avian_collisions.pdf.

North Dakota State Water Commission Mapservice. n.d. http://mapservice.swc.nd.gov/ (accessed March 29, 2013).

North Dakota Department of Health. "Air Quality in North Dakota." *North Dakota Department of Health.* July 07, 2008. http://www.ndhealth.gov/AQ/Publications/AirQualityTrifold.7-7-2008.pdf (accessed March 29, 2013).

North Dakota Department of Transportation. *2011* Traffic Volume Map. 2011. http://www.dot.nd.gov/road-map/pdf/traffic/trafficstate_2011.pdf (accessed March 29, 2013).

North Dakota Division of Oil and Gas. "Oil and Gas Shapefiles." https://www.dmr.nd.gov/OaGIMS/viewer.htm, February 2013.

North Dakota Rural Water Systems Association. *North Dakota Rural Water Systems Association.* 2009. http://www.ndrw.org/ (accessed March 29, 2013).

North Dakota State Water Commission. *ND State Water Commission Mapservice.* 2013. http://mapservice.swc.nd.gov/ (accessed March 29, 2013).

Northern Plains Electric Cooperative. *Co-op History: Northern Plains Electric Cooperative.* n.d. http://www.nplains.com/Your_Co-op/Co-op_History/index.html (accessed March 29, 2013).

Pearce, D. 2010. The bald eagle is strengthening its roots. The Expositer. Available online at: http://www.brantfordexpositor.ca/ArticleDisplay.aspx?e=2521196&archive=true.

Pearce-Higgins, J.W., L. Stephen, A. Douse, and R.H.W. Langston. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology 49:386-394.

Poletti and Associates, Inc. *A Real Estate Study of the Proposed Forward Wind Energy Center Dodge and Fond DuLac Counties, Wisconsin.* Prepared for Invenergy Wind LLC, 2005.

Rich, T.D., C. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

Sauer, J.R., J.E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, results and analysis 1966 - 2006. Version 05.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD.

Shaffer, J. and D. Johnson. 2008. Displacement Effects of Wind Developments on Grassland Birds in the Northern Great Plains. NWCC Wind Wildlife Conference, October 2008. Milwaukee, WI.

"Soil Survey Geographic (SSURGO) database for Stutsman County, North Dakota." *Natural Resources Conservation Service.* Fort Worth, Texas, 2012.

Sterzinger, George, Fredric Beck, and Damian Kostiuk. *The Effect of Wind Development on Local Property Values.* Analytical Report, Washington, D.C.: Renewable Energy Policy Project, 2003.

Stutsman County. *Stutsman County Emergency Management.* n.d. http://www.co.stutsman.nd.us/emergency_management.html (accessed March 29, 2013).

U.S. Army Corps of Engineers; Wakeley, J.S.; Lichvar, R.W.; Noble, C.V. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plain Region (Version 2.0).* Vicksburg, MS: U.S. Army Engineer Research and Development Center, 2010.

U.S. Department of Energy. *Wind Powering America: Utility-Scale, Land-Based 80-meter Wind Maps.* September 12, 2012. http://www.windpoweringamerica.gov/wind_maps.asp (accessed March 29, 2013).

U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute. "Reducing Environmental Cancer Risk. What We Can Do Now." *National Cancel Institute.* April 2010. http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf (accessed March 29, 2013).

U.S. Department of the Interior; U.S. Geological Survey. "Ecoregions of North Dakota and South Dakota." *United States Geological Survey, Northern Prairie Wildlife Research Center.* February 02, 2013.

http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/nodak.htm (accessed March 29, 2013).

U.S. Department of Agriculture. "2007 Census of Agriculture." *USDA Census of Agriculture.* February 2009. http://www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf (accessed March 29, 2013).

U.S. Department of Agriculture. "USDA Agricultural Handbook 296; Major Land Resource Regions Custom Report." 2006.

U.S. Department of Agriculture, Natural Resources Conservation Service. *National Soil Survey Handbook Part 622 | NRCS Soils.* n.d. http://soils.usda.gov/technical/handbook/contents/part622.html (accessed March 29, 2013).

United States Fish and Wildlife Service (USFWS).1988. Recovery plan for piping plovers (Charadrius melodus) of the Great Lakes and the Northern Great Plains. Twin Cities, MN.

USFWS. 2010. Endangered and threatened wildlife and plants; 12-month finding on a petition to list Sprague's pipit as endangered or threatened throughout its range. Federal Register/Vol. 75, No. 178.

USFWS. 2012a. County Occurrence of Endangered, Threatened, and Candidate Species and Designated Critical Habitat in North Dakota. Available online at http://www.fws.gov/northdakotafieldoffice/county_list.htm.

USFWS. 2012b. Piping plover (*Charadius melodus*). Available online at http://www.fws.gov/northdakotafieldoffice/endspecies/species/piping_plover.htm

USFWS. 2012c. Dakota skipper (Hesperia dacotae). Available online at http://www.fws.gov/northdakotafieldoffice/endspecies/species/dakota_skipper.htm

USFWS. 2012d. Species of Habitat Fragmentation Concern. Available online at http://www.fws.gov/northdakotafieldoffice/species_of_habitat_fragmentation.htm

USFWS. 2013. Flyways.us. Available online at http://www.flyways.us/.

United States Geologicical Survey (USGS). 2013a.

USGS. 2013b. Ecoregions of North Dakota and South Dakota. Available online at http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/nodak.htm.

Winters, Harold A. "Geology and ground water resources of Stutsman County, North Dakota, Part 1: Geology." *North Dakota State Water Commission.* 1963. http://swc.state.nd.us/4dlink9/4dcgi/GetSubContentPDF/PB-347/Stutsman_Part_1.pdf (accessed March 29, 2013).

World Health Organization. *WHO| What are Electromagnetic Fields?* 2013. http://www.who.int/peh-emf/about/WhatisEMF/en/ (accessed March 29, 2013).

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