Final

Environmental Assessment

Burleigh County Wind Energy Center

Burleigh County,
North Dakota

Western Area Power Administration

FPL Energy
Burleigh County Wind, LLC

Basin Electric Power Cooperative

Central Power Electric Cooperative, Inc.

DOE/EA - 1542
August 2005

CHAPTER 1
INTRODUCTION

The Burleigh County Wind Energy Center is a wind generation project proposed by FPL Energy Burleigh County Wind, LLC (Burleigh County Wind). The proposed project would produce up to 50 megawatts (MW) of electricity, averaged annually. The proposed project is located in Burleigh County, North Dakota, approximately 3 miles south and 2 miles east of the town of Wilton, North Dakota (**Figures 1-1 and 1-2**).

Central Power Electric Cooperative (Central Power), a member of the Basin Electric Power Cooperative (Basin), would construct a new 230-kilovolt (kV) transmission line, approximately 4.4 miles long, to connect the proposed Wind Energy Center to a U.S. Department of Energy (DOE) Western Area Power Administration (Western) transmission line, called the Garrison-Bismarck 230-kV Transmission Line. The interconnection with Western's transmission line would require modifications to the existing Western facility, including construction of a temporary interconnection called a "tap" and a permanent switching station. The project is scheduled to be operational by the end of 2005. Electricity produced from the project is expected to meet the energy demands of approximately 30,000 North Dakota households.

The project is a Federal action under the National Environmental Policy Act (NEPA), Section 102(2) (1969), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), DOE NEPA Implementing Procedures (10 CFR Part 1021), and other applicable regulations. Western prepared this environmental assessment (EA) under these regulations to describe the analysis of environmental effects of the proposed project (proposed action) and alternatives, including the no-action alternative.

PURPOSE OF AND NEED FOR ACTION

The DOE Energy Information Administration (DOE-EIA) is forecasting a 1.8 percent annual growth in electricity sales through 2020. This growth will require an increase in generating capacity of up to 1,300 new power plants over the next 20 years (DOE-EIA 2001). Deregulation of the electric industry and current energy supply issues have emphasized the need for new and diverse energy sources in the region.

APPLICANTS' UNDERLYING NEED

Project proponents need to provide additional network resources to meet load obligations and support renewable resources.

Basin needs to meet a recent shareholder directive to diversify its current generation portfolio, which includes coal, hydroelectric, and gas with an economical renewable energy source.

Burleigh County Wind and Central Power need to develop, operate, and maintain the generation and transmission infrastructure.

AGENCY PURPOSE AND NEED

Basin has a Network Integration Service Agreement under Western's Open Access Transmission Tariff (Tariff) and applied to interconnect a new Designated Network Resource to Western's existing Garrison-Bismarck 230-kV Transmission Line. Western is required pursuant to the terms of its Tariff to respond to Basin's request and, in responding to the need for agency action, has the following purposes:

- Western offers capacity on its transmission system to deliver electricity when such capacity is available, under Western's Tariff. The Tariff has been approved by the Federal Energy Regulatory Commission (FERC) as being consistent with the Commission's Final Order Nos. 888, 888A, 888B, and 888C, which are intended to ensure non-discriminatory transmission system access. Pursuant to the Commission's Order Nos. 2003, 2003-A and 2003-B, Western submitted revisions to its non-jurisdictional Tariff on January 25, 2005, to the Commission. The purpose of the filing was to revise certain terms of Western's original Tariff and to incorporate the Large Generator Interconnection Procedures and a Large Generator Interconnection Agreement which are applicable to the 100MW interconnection request from Basin. FERC conditionally approved Western's Tariff revisions on July 6, 2005. Western needs to respond to the interconnection and transmission service requests under the provisions of its revised Tariff.

- Western is required to ensure protection of transmission system reliability and service to existing customers. Western's purpose is to ensure that existing reliability and service is not degraded. Western's LGIP provides for transmission and system studies to ensure that system reliability and service to existing customers is not adversely affected.

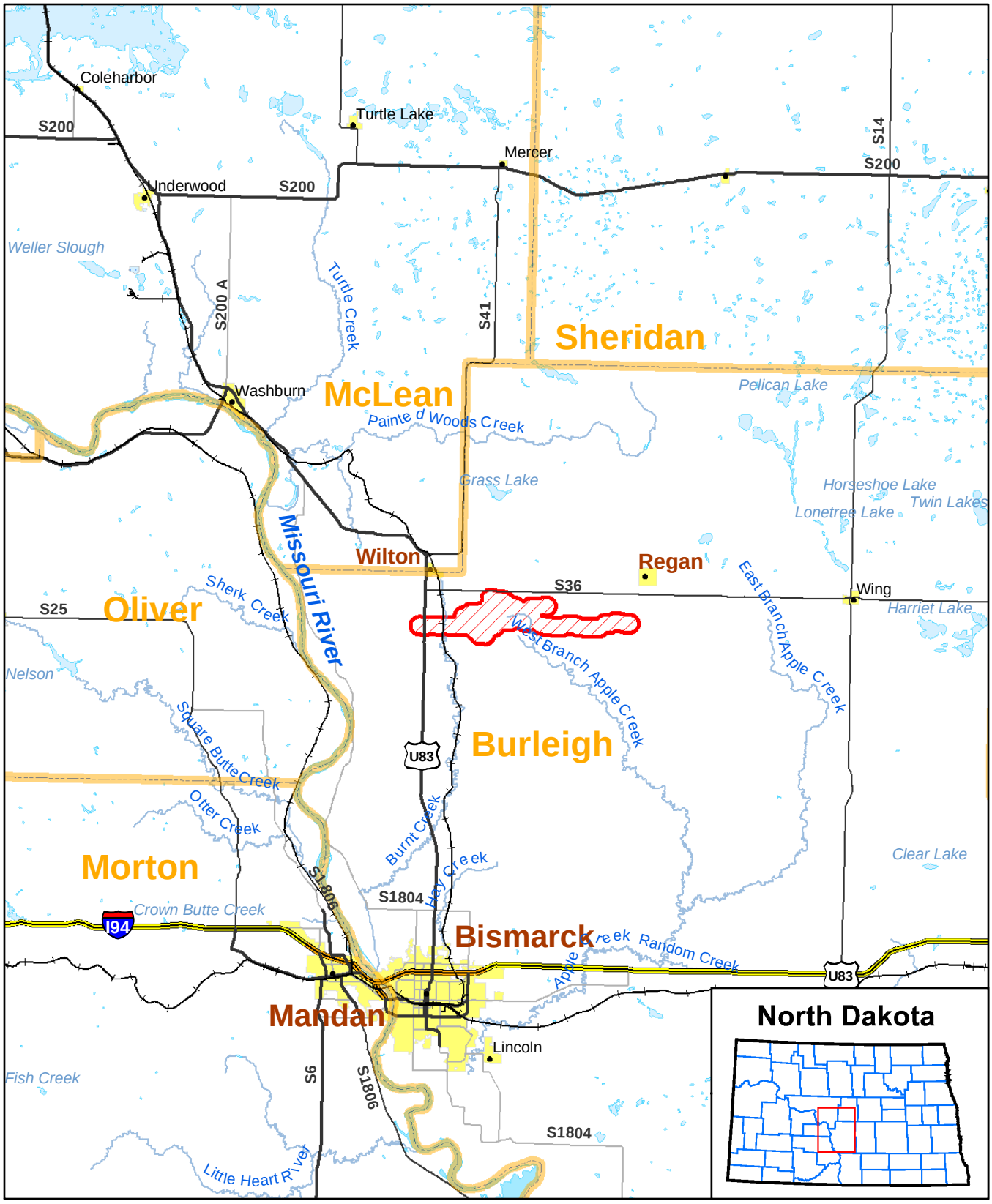

Figure 1-1
Project Location
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC.

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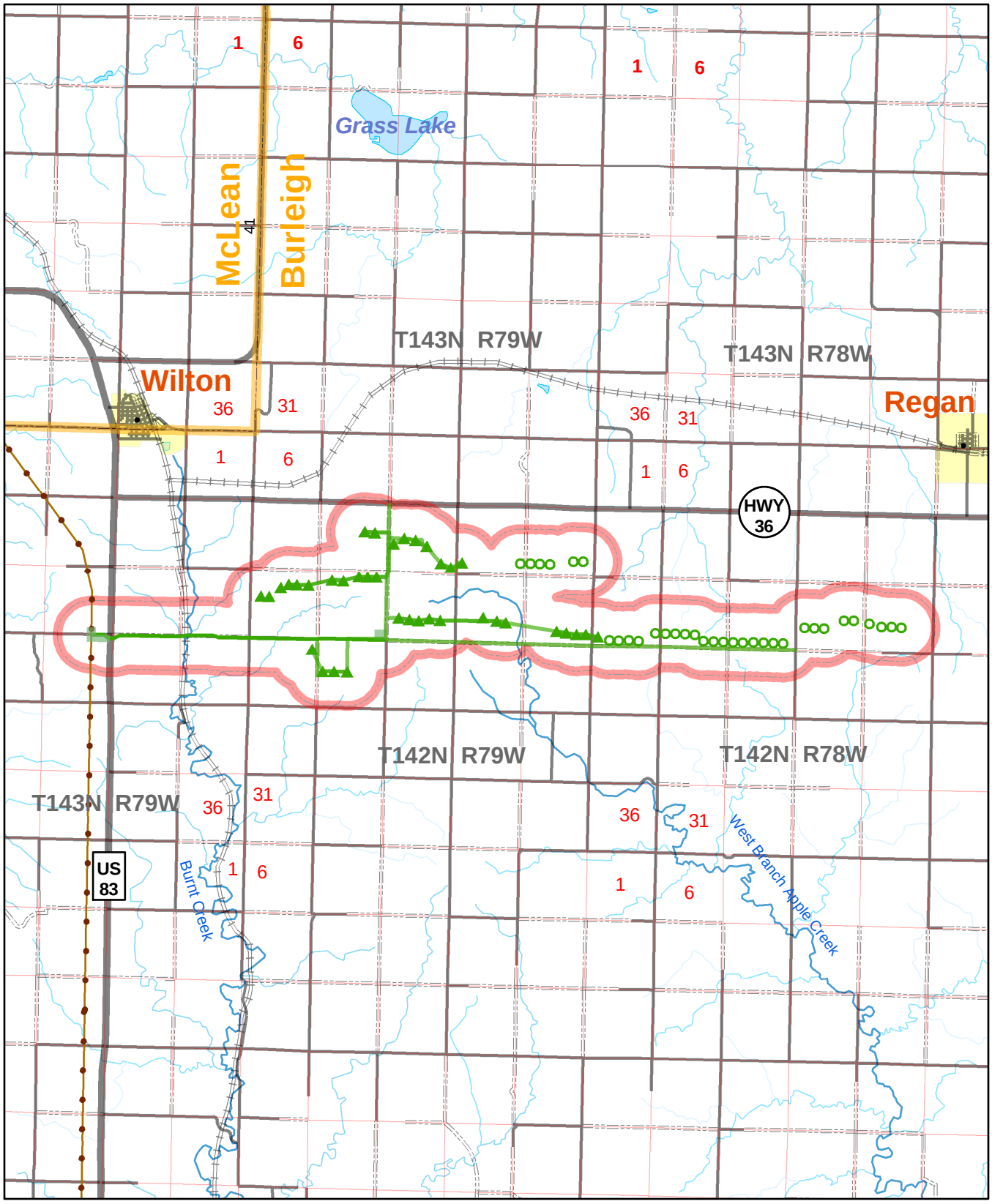

Figure 1-2
Local Overview
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC.

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The Applicant's objectives must be considered. Because the statement of purpose and need affects the extent to which alternatives are considered reasonable, it is important to understand both the agency's purpose and need and that of the applicant.

AUTHORIZING ACTIONS

Federal, state, and local agencies, including Western, have jurisdiction over certain aspects of the proposed action. **Table 1-1** provides a listing of agencies and their respective permit/authorizing responsibilities with respect to the proposed Burleigh County Wind Energy Center.

AGENCY CONSULTATION AND PUBLIC PARTICIPATION

Western has consulted with the various state and Federal agencies and Tribes (listed in Chapter 4 of this document) in the development of this analysis. In addition, Western will consider comments to this EA from agencies, tribes, landowners, and other interested parties.

TABLE 1-1
Permit/Authorizing Responsibilities

Authorizing Action/Statute	Responsible Agency
Interconnection/Transmission Service Agreement	Western
230-kV Transmission Line Construction	North Dakota Public Service Commission
Utility Occupancy Agreement	North Dakota Department of Transportation (NDDOT)
Easement Grants and Road Crossing Permits	NDDOT, Ecklund Township Board
Review and Approval of Weed Control Plan	Burleigh County, Ecklund Township Board
National Environmental Policy Act	Western
National Historic Preservation Act	Western, North Dakota State Historical Preservation Office (NDSHPO)
Native American Graves Protection and Repatriation Act	Western
American Indian Religious Freedom Act	Western
Construction Storm Water Permit	North Dakota Department of Health (NDDoH), North Dakota Division of Water Quality, Storm Water Program
Clean Water Act Compliance	U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service (USFWS)
Safety Plan	North Dakota Occupational Safety and Health Administration
Migratory Bird Treaty Act	USFWS, Western
Endangered Species Act	USFWS, Western
Tower Lighting	Federal Aviation Administration (FAA)

CHAPTER 2
DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

Burleigh County Wind proposes to construct, own, and operate a wind energy center in Burleigh County, North Dakota. The Burleigh County Wind Energy Center (Wind Energy Center) would consist of no more than 66 wind turbines (33 initially as part of phase I, and up to an additional 33 in phase II) with an output of up to 50 MW, averaged annually. Central Power proposes to construct, own, and operate approximately 4.4 miles of 230-kV transmission line and associated structures, equipment, and facilities as part of the first phase of development. The transmission line would originate at the proposed Burleigh County Wind collection substation and continue west to interconnect with Western's existing Garrison-Bismarck 230-kV Transmission Line.

PROPOSED ACTION

The proposed Burleigh County Wind Energy Project (Proposed Action) is located near the rural communities of Wilton and Regan in central North Dakota, approximately 18 miles north of Bismarck, North Dakota (**Figure 2-1**). The Proposed Action would consist of the following components:

- Access roads;
- Thirty-three 1.5-MW General Electric (GE) turbines as part of the initial development;
- Thirty-three additional turbines as part of the expanded project;
- Collection transmission lines;
- A collection substation at the Wind Energy Center;
- A 230-kV high voltage transmission line from the collection substation to the point of interconnection with Western's existing Garrison-Bismarck 230-kV Transmission Line;
- A temporary interconnection facility ("tap") at the point of interconnection with Western's existing Garrison-Bismarck 230-kV Transmission Line; and,

- A new permanent switching station at the point of interconnection with Western's existing Garrison-Bismarck 230-kV Transmission Line.

All facilities would be constructed in accordance with the National Electrical Safety Code, U.S. Department of Labor Occupational Safety and Health Standards, and *Central's Power System Safety Manual* for maximum safety and property protection. The following sections describe these project components, pre-construction planning, and construction activities associated with each.

PRECONSTRUCTION ACTIVITIES

Preconstruction activities included site surveys and studies, landowner agreements, engineering design, and configuring proposed project facilities:

Preconstruction Surveys and Studies

Preconstruction surveys were conducted to ensure the feasibility of the Proposed Action and to avoid, minimize, or mitigate impacts to existing resources. A full summary description of these surveys and their use follows.

Meteorological studies were conducted for 1 year to determine the characteristics of the wind resource in the project vicinity. The results of these studies were used to ensure project feasibility and determine the most efficient location of the wind turbines.

A Class I cultural resources study (record search) and Traditional Cultural Property (TCP) survey was conducted to research and document the location of these resources with respect to the Proposed Action. A Class III cultural resources survey (intensive ground survey) was conducted for the areas associated with Phase I of the Proposed Action. A Class III cultural resources survey would be conducted for all areas of subsequent development. The locations of all facilities would be adjusted to avoid the cultural and TCP resources.

Wetlands surveys were completed for the Proposed Action to determine the presence of jurisdictional and non-jurisdictional wetlands in the project area. The locations of the facilities would be adjusted to avoid and minimize wetland impacts.

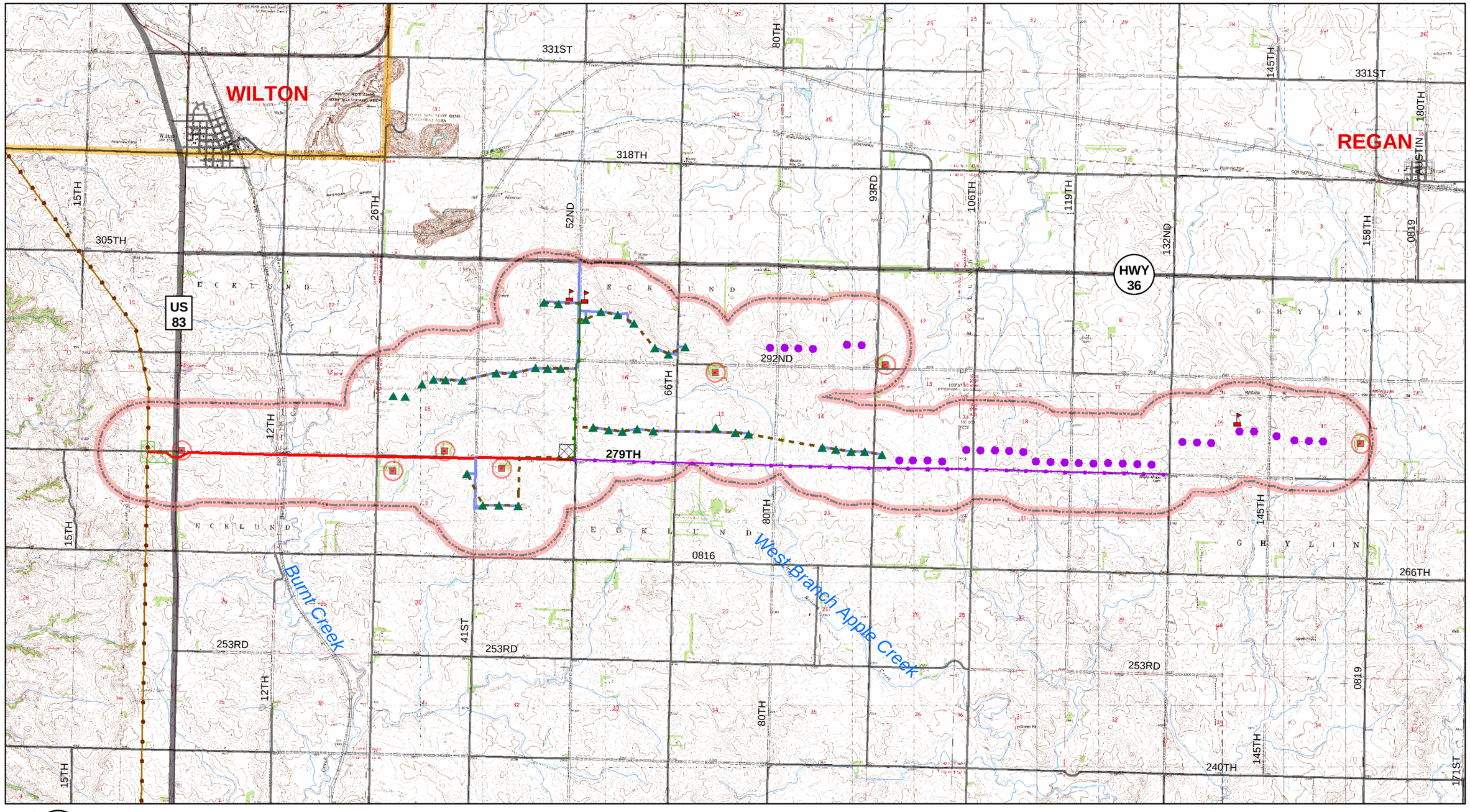

Figure 2-1
Project Area Detail
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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Wildlife surveys were completed in the vicinity of the Proposed Action. These surveys included a stick-nest survey for tree nesting raptors, a lek survey for sharp-tailed grouse, and spring point-count surveys to determine avian species composition. The surveys were designed to document wildlife use on the site and ensure that the Proposed Action would not be located in an area used extensively by sensitive wildlife species.

Landowner Agreements

The project proponents entered into agreements with landowners in order to secure rights to access their property for surveys, testing, construction, operation, and maintenance of the project components. These agreements were developed in consideration of landowner concerns, and include compensation for disturbance and loss of farming access during project construction, operation, and maintenance. Landowner agreements have not yet been secured for all of phase II of the project.

Project Planning & Design

Project planning considered project components, equipment, and material sources available for use in construction and operation. The location and design of all project facilities would avoid sensitive resources. Generally, land requirements and disturbance areas for each of the components are shown in **Table 2-1**.

Gravel and Fill

Staging and construction activities associated with the Proposed Action would require access to gravel. During construction, gravel will provide a surface suitable for working during wet conditions. As described later in this chapter, some permanent access roads will remain graveled after construction to support access during all weather conditions. It has been determined that gravel for these activities would be supplied by local gravel pits which have been identified by the construction contractors as sufficient to meet staging and construction needs. The selected contractor's current gravel source is located in the East ½ Northwest ¼ Section 27, Township 144 North, Range 80 West. Metcalf Archeological Inc. has verified that this gravel pit is in compliance with the North Dakota Department of Transportation's (NDDOT) requirements for cultural resources clearance. Metcalf would include documentation to this affect in the final cultural resources report which would be submitted to the SHPO and Western to satisfy the

conditions of their concurrence letter. If additional sources of gravel or fill material are required during project construction, those sources would be surveyed or documentation would be provided to ensure cultural resource clearances are obtained.

TABLE 2-1
Summary of Disturbances

Component	Construction Requirements (temporary)	Maintenance/Operations Requirements (long-term)
Turbines	500 feet by 500 feet including associated laydown	50 feet by 50 feet
Turbine Transformers	Within turbine construction area	6 feet by 6 feet
Access Roads to turbines	7.2 miles 40 feet wide disturbance within 100 feet wide construction ROW	7.2 miles 32 feet wide
Underground Lines (trenches)	8 miles long Disturb area no more than 50 feet wide within 100 feet wide construction ROW	Trenches filled, regraded, and vegetated. No permanent surface disturbance
Overhead Sub-transmission Line	50 by 50 feet at each structure within 100 ft ROW	3 feet by 3 feet at each structure
Collection Substation	2 acres	2 acres
Laydown Area	15 acres	15 acres
230-kV Transmission Line	50 feet by 50 feet	7 feet by 7 feet
Temporary Tap	100 feet by 100 feet with 133 foot construction right of way	Restored to original contour and vegetated following construction of permanent switching station
	50 feet by 50 feet temporary maintenance area	
Switching Station	470 feet by 750 feet	470 feet by 750 feet

PROPOSED FACILITIES

Burleigh County Wind expects to bring the proposed Wind Energy Center online within approximately 90 days from the start of construction. Construction impacts would be temporary and would include the use of bulldozers, graders, trenching machines, concrete trucks, tractor-trailer trucks, and large cranes.

The proposed project facilities would consist of the following components and are described sequentially from the Wind Energy Center to the point of interconnection – generally east to west within the proposed project area:

Wind Turbines – Turbines would be used to convert wind energy from the Wind Energy Center into electrical energy.

Access Roads – Gravel roads would be installed to provide access to each turbine and along the proposed new 230-kV transmission line to allow for construction, operation, and maintenance activities.

Electrical Collection System (underground and overhead 34.5 kV sub-transmission lines) – The overhead and underground sub-transmission lines would be used to transmit electricity from each of the wind turbine transformers to the electrical collection substation.

Electrical Collection Substation – The collection substation would be used to transmit electricity from the turbines to the 230-kV high voltage transmission line,

Laydown Yard – The laydown yard would be used for the storage of construction materials and equipment (see Burleigh County Wind Laydown Yard for further details).

230-kV High Voltage Transmission Line – The 230-kV high voltage transmission line would connect the electrical collection substation to the point of interconnection at Western's existing Garrison-Bismarck 230-kV Transmission Line.

Temporary Tap – The tap would be used to temporarily connect the 230-kV high voltage transmission line into the existing Bismarck-Garrison 230-kV Transmission Line,

Permanent Switching Station – The switching station would be used to provide a permanent point of interconnection between the 230-kV high voltage transmission line and the existing Bismarck-Garrison 230-kV Transmission Line.

The following criteria were considered in the planning of project components of the Proposed Action:

- Establish a thousand-foot radius from turbine sites for safety, noise, vibration, and shadow flicker buffer zones for residences.
- Avoid and minimize impacts to avian species through avoidance of high use areas relative to surrounding areas.
- Avoid unnecessary wetland disturbances, including a 50-foot avoidance buffer from all wetlands not previously converted to agricultural use, and permit all necessary disturbances to wetlands.
- Avoid cultural and historic resources.
- Comply with permits and applicable Federal state, and local regulations.

Roads would be constructed and upgraded prior to installation of the proposed facilities. Existing and new roads would be used to move equipment, personnel, and materials during the construction, maintenance, and operations of the Proposed Action. Heavy equipment related to the construction phase of the Proposed Action would gain access to the Wind Energy Center via the existing gravel roads (93rd Street, 66th Street, and 52nd Street traveling south from State Highway 36).

Civil Construction –New access roads, serving all facilities associated with the Proposed Action would be constructed from existing street and avenue routes. Topsoil would be salvaged from road areas and replaced on roadside slopes and other associated areas following construction to provide a reclaimed growth medium. All access roads would be constructed in association with the wind turbines. No new access roads are required for collector or transmission lines. Graded surfaces within the footprints of the laydown area, substation, and switching station are separately described in associate with the facilities' descriptions.

Roads serving the turbines would be graded and compacted to a total width of approximately 32 feet to facilitate large truck travel. The length of new and upgraded roads required for access to the initial 33 turbines is 7.2 miles. The locations and lengths of roads required for the expansion array and overhead collection transmission line have not yet been determined.

Wind Turbines

The Proposed Action would include construction of an initial 33 turbines that would be constructed during the year 2005 and placed in operation prior to December 31, 2005. Up to 33 additional turbines would be planned and constructed in 2006, or subsequent years, for a total of up to 66 turbines. The proposed turbine arrangement, or "array", for both phases is shown in **Figure 2-1**; however, only the first 33 turbine locations have been finalized. As with the initial installation, expansion turbines would be sited to make best use of the wind resource and avoid or minimize impacts to sensitive areas.

Figure 2-2 provides a diagram and photograph of the GE horizontal axis, three-blade propeller turbines. The approximate height of the turbines would be 360 feet from the top of the swept area to the ground surface. The bottom of the swept area above the ground surface would be approximately 160 feet. These heights would allow the turbines to take advantage of more consistent and less turbulent winds.

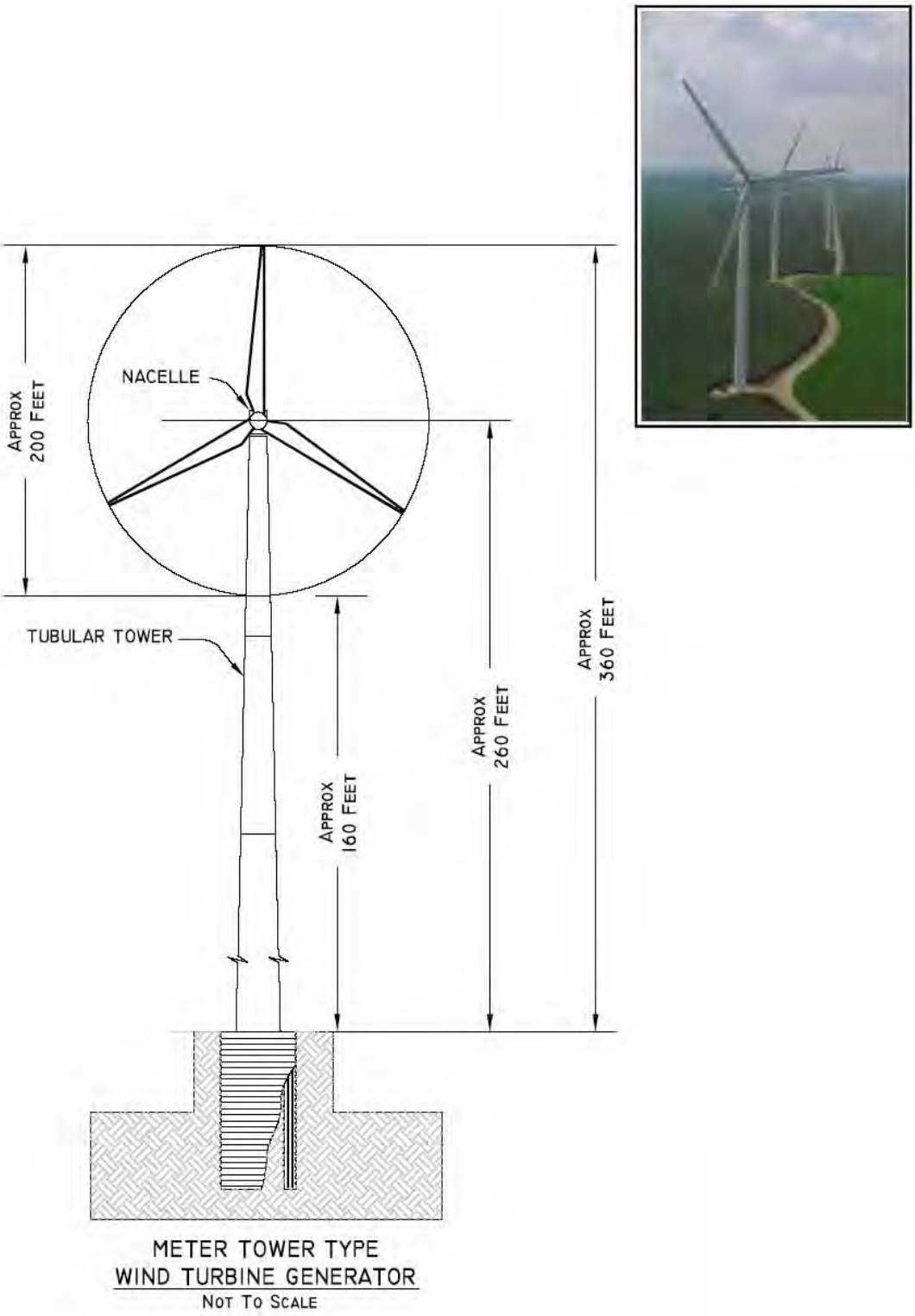

Figure 2-2
Wind Turbine Diagram and Photograph
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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Construction

A photo series depicting the typical process of erecting a turbine is located in **Appendix A**. All activities related to wind turbine construction would occur within a 500 feet by 500 feet area centered on the turbine site. Wind turbine and access road construction is typically accomplished in the following manner:

Civil Construction – Civil work is usually performed about 3 to 6 weeks prior to the start of any other construction activities. Civil construction entails surveying, clearing, grubbing, excavating, and constructing turbine foundations.

An area of approximately 50 feet by 50 feet would be cleared with a bulldozer and/or road grader and excavated with a backhoe to prepare for each concrete foundation. Excess excavated material would be used for road construction or otherwise disposed of in accordance with all applicable regulations and permit conditions. An aluminum tube and bolt cage would be installed inside and concrete placed into the hole. Approximately 150 cubic yards of concrete would be needed for each turbine. Concrete spoil would be disposed of off-site by the contractor. Once cured, the foundation would be complete and ready to receive the turbine tower.

Delivery and Access – Major wind turbine components (including rotor assemblies, towers, power cables, and transformers) would be delivered to the wind project site by tractor-trailers on existing and/or developed access roads. A 500-foot-wide construction easement would extend along each turbine access road and turbine foundation allowing for rotor assembly, installation of underground and aboveground electrical facilities, and access road construction.

Structural – Turbine and tower assembly, and erection of the towers onto the turbine foundations, would be completed during this task. This work would also include installation of all mechanical and electrical systems associated with the turbines.

Testing – The testing period would start well into the proposed project, usually 3 to 6 months after the start of construction, and would typically last 2 to 3 months. This phase would include all the testing required to make the Wind Energy Center commercially operational. This incremental process would involve energizing the collection substation and bringing each turbine online until the commercial operation date.

Restoration and Final Project Completion – This last task in wind project construction would entail restoration and cleanup of all project disturbances. Areas of permanent disturbance at each turbine would include those areas occupied by turbines and access roads. Areas temporarily disturbed during

construction would be restored to pre-construction conditions. Additional details related to reclamation and restoration are presented in the Restoration and Reclamation section of this document.

Operation and Maintenance

The Wind Energy Center would be supported by two full-time technicians during normal business hours. Maintenance activities would occur periodically, resulting in approximately one truck trip along project roads per day from spring through fall, and periodic visits to project turbines and substations during the winter. Equipment to be stored at the Burleigh County Wind Laydown Yard and used at the project for operation and maintenance activities would include the following:

- One service truck on site;
- One small bulldozer with a forklift and snow plow;
- One road grader that would be shared with other projects;
- One 4-wheeler; and,
- One snowmobile.

To facilitate operation and maintenance, project access roads would be graded as necessary. Maintenance activities would be limited to areas accessible by these roads

Each turbine would be serviced twice a year. Typical turbine servicing activities would include temporarily deploying a crane within the construction easement of each turbine, removing the turbine rotor, replacing generators, bearings, and deploying personnel to climb the towers to service parts within the turbine.

Computer systems inside each turbine would perform self-diagnostic tests and allow a remote operator to set new operating parameters, perform system checks, and ensure turbines are operating at peak performance. Turbines would automatically shut down if sustained winds reach 56 miles per hour (mph) or gusts reach about 100 mph. The Wind Energy Center would be monitored and operated year-round by Burleigh County Wind.

Collection System

A sub-transmission line collection system consisting of a 1750 KVA, 3 phase pad mounted transformer at each turbine would connect to a network of underground 34.5kV and overhead 34.5kV transmission lines.

This system would collect the electricity generated by each of the 33 individual turbines and transmit it to the electrical collection substation.

Construction

Transformers

Pad-mounted transformers would be located within 20 feet of the base of each turbine tower. The approximately 5-foot-square steel transformer box, housing the transformer circuitry, would be mounted on an approximately 6-foot-square fiberglass box pad. **Figure 2-3** shows a typical pad mounted transformer and its location near the base of a turbine tower.

Underground Collection Line

Approximately 8 miles of underground collection line would be installed for the first 33 turbines and an additional 8 miles would be installed for the expansion array. The collection line cable would consist of a 1,000,000 circular mils (1,000 MCM), 4/0 cable buried in trenches at a depth of 42 to 54 inches (nominal depth of 48 inches). Trenches are anticipated to be approximately 2 feet wide and 4 feet deep and would generally follow access roads. However, where shorter distances could be achieved through more direct paths, the shorter routes would be implemented as shown in **Figure 2-1**.

Trenches would be excavated using both a trencher and a backhoe. Disturbance associated with all buried collection lines would be limited to a 100-foot wide construction corridor associated with each proposed linear disturbance. All trenches would be filled with compacted material and associated disturbances would be reclaimed following burial of the electrical cables (see the section on Reclamation/Restoration for further details). Above-ground utility warning markers would be installed at appropriate intervals to ensure safety and line integrity.

Overhead Collection Line

Approximately 1.6-miles of overhead 34.5-kV sub-transmission collection line (collection line) would be constructed along 52nd Street to collect power from the northernmost turbines (see **Figure 2-1**). Underground lines would also be connected to this common overhead line, which would eventually connect to the collection substation. Collection lines from the southernmost four turbines would be buried and connected directly at the collection substation.

Project development associated with the eastern expansion would include construction of an additional 6.4 miles of overhead 34.5-kV collection line. This line would be installed outside of the existing road right-of-way (ROW) along 279th Avenue, as shown in **Figure 2-1**.

Single wood-pole structures would be used for the overhead collection line. Wood poles are readily available, can be installed using simple construction techniques, and can be easily modified or replaced to reduce outage time during emergencies. In addition, the life expectancy of these poles is approximately 45 years.

Typically, 10 percent of the pole length plus 2 feet is buried (i.e., an 80-foot pole would be buried 10 feet). An approximately 24-inch auger would be used to drill holes and a crane or boom truck would be used to set the structures in place. Soil excavated from the holes would be backfilled and compacted to ensure stability and drainage away from the structure.

The structures would be spaced approximately 300 feet apart. Using these spacing standards would require approximately 15 structures per mile. Disturbance at each structure would likely average 50 feet by 50 feet, and would be confined to the 100-foot temporary construction corridor. Permanent disturbance would include the site occupied by the poles (a footprint of less than 3 feet by 3 feet). An illustration of powerline stringing techniques is shown in **Figure 2-4** and more fully described later in this chapter. An illustration of an example overhead 34.5-kV collection line structure is shown in **Figure 2-5**.

Operation and Maintenance

Transformers

Pad mounted transformers would be maintained as part of normal operations and maintenance activities and would be accessed from the turbine access road. In the event of transformer failure, replacement of this equipment could be accomplished from the turbine access road.

Underground Collection Line

Periodic maintenance of underground collection lines would be required during the life of the project. Maintenance activities are permitted under the landowner easement agreements and would be conducted within the established easement width. Maintenance disturbance associated with all buried collection lines would be limited to a 100-foot wide construction corridor associated with each proposed linear disturbance. All trenches would be filled with compacted material and associated disturbances would be reclaimed following burial of the electrical cables. These activities would be conducted in compliance with applicable Federal, state and local regulations and the terms of the landowner easement. Underground collection lines are relatively maintenance free and maintenance would be on an as needed

Pad Transformer at Base of Turbine

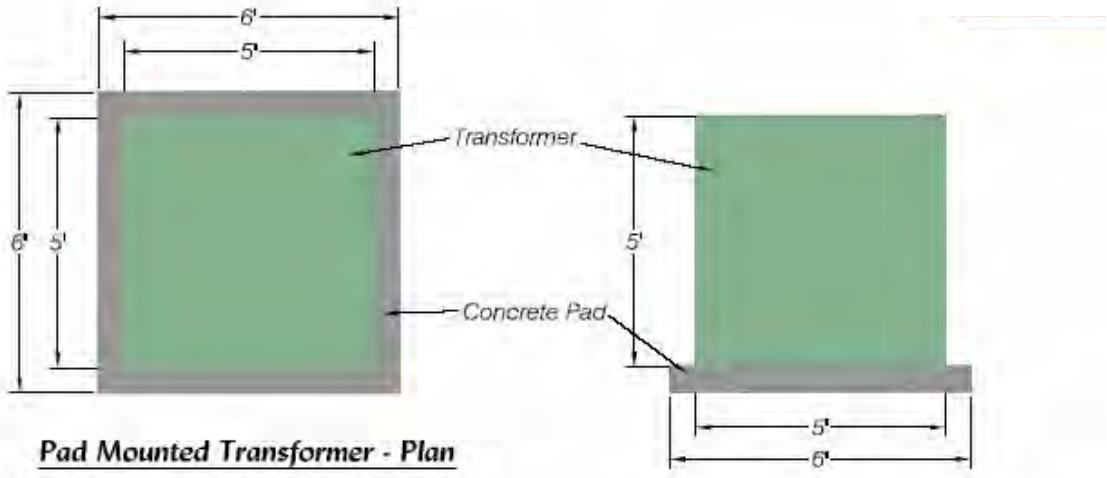

Figure 2-3
Turbine Base with Transformer
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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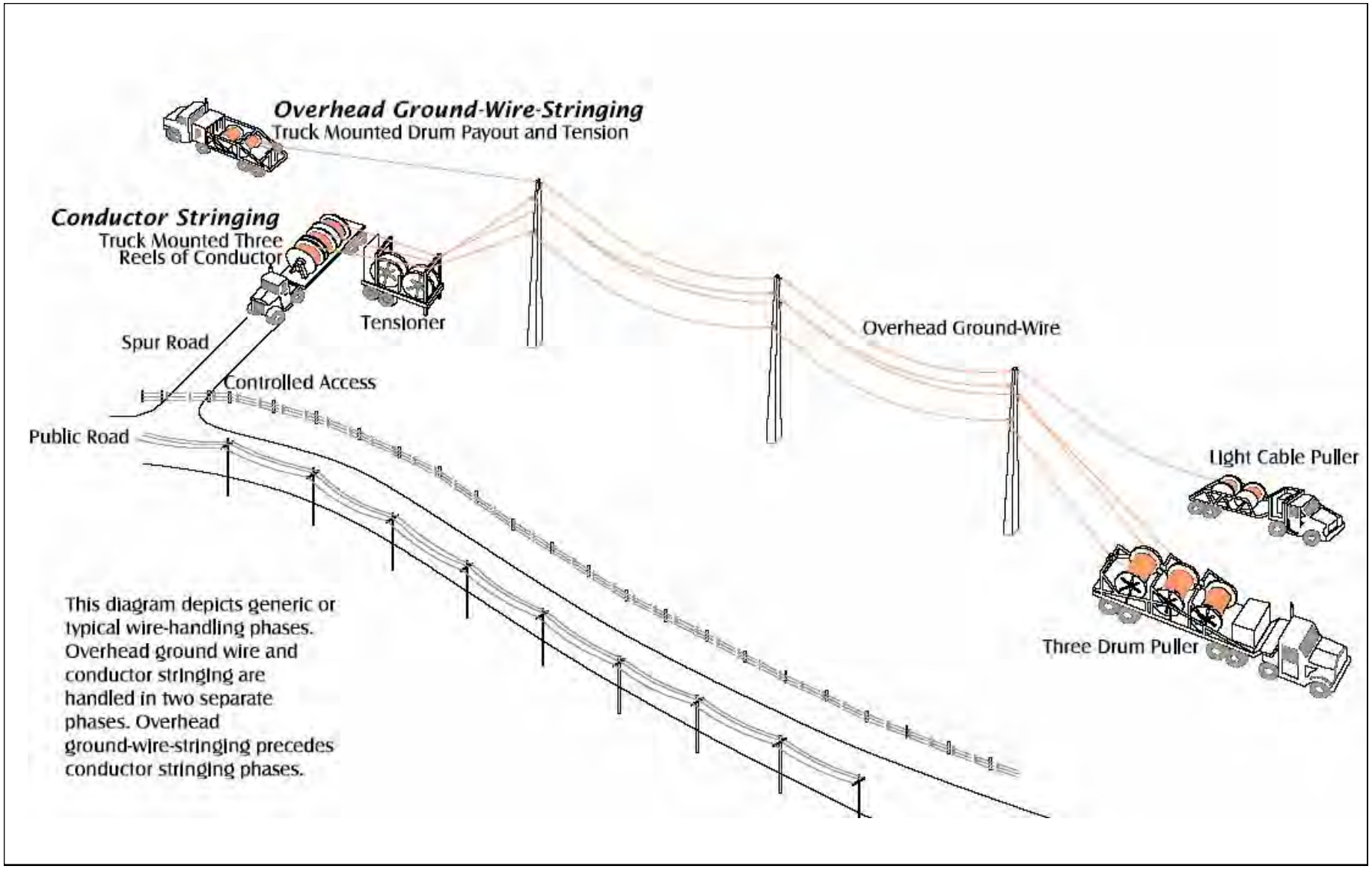

Figure 2-4
Wire Handling Equipment
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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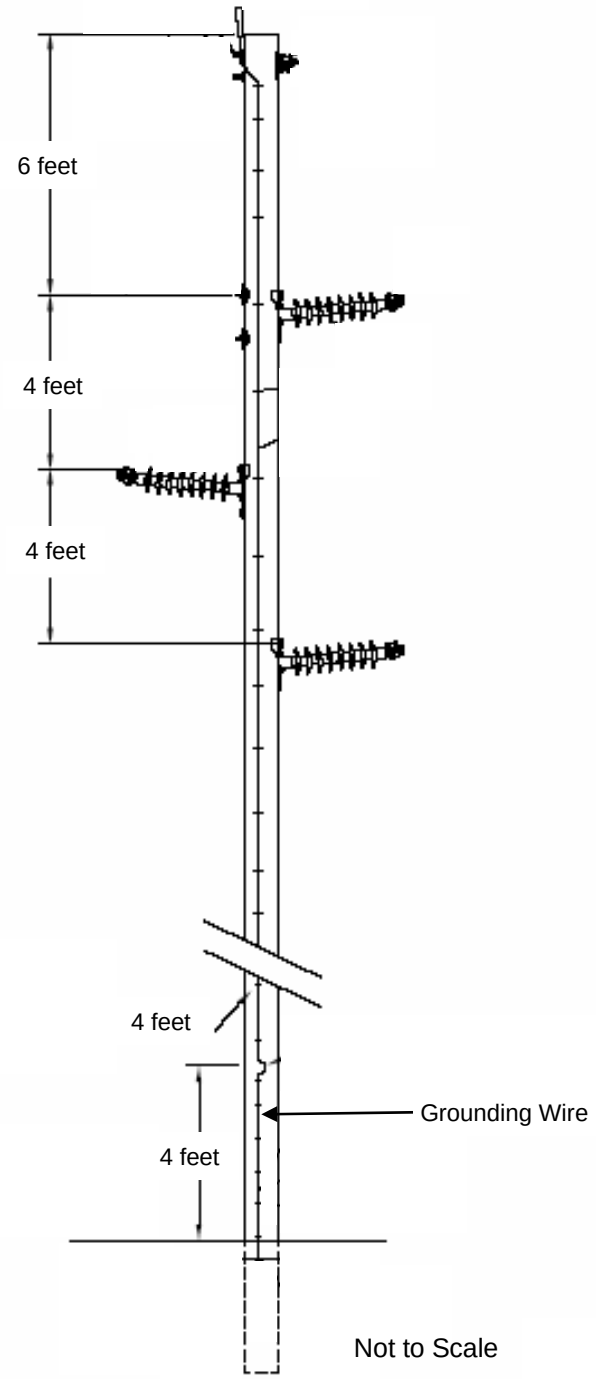

Figure 2-5
Typical 34.5-kV Transmission Line Structure
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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basis only; consequently maintenance activities would not be frequent and would require excavation only in isolated areas, rather than the entire line.

Overhead Collection Line

Periodic maintenance of overhead collection lines would be required during the life of the project. Maintenance activities are permitted under the landowner easement agreements and would be conducted within the easement width. Typical tasks would include periodic inspections, structure and hardware replacement, and line maintenance activities. These activities would be conducted in compliance with applicable Federal, state and local regulations and the terms of the landowner easement and be managed by the onsite O&M Staff.

Collection Substation

An electrical collection substation would be built as part of a 17 acre lay down and substation area adjacent to the Burleigh County Wind Energy Center turbine array. This substation would be owned by Burleigh County Wind. The substation would be designed in compliance with Federal, state, and local regulations, and prudent industry practices.

At the collection substation, the 34.5-kV collection voltage would be converted to 230 kV to connect to the proposed new 230-kV transmission line. There would be two 34.5-kV breakers in metal-clad switchgear (building) for the two electrical circuits and one 34.5-kV breaker for the capacitor bank. The two circuits would feed into the power transformer with one 230kV breaker between the power transformer and the 230-kV Transmission Line. The ancillary equipment at the substation would consist of metering, relays, switches, control panel, relay panels, and lighting. The substation would have a footprint of no greater than 2 acres as shown in **Figure 2-1**.

The substation would have a gravel base. It would contain circuit breakers, transformers, switches, lightning protection, ground wires, a control building, and three, approximately 25-foot tall wood transmission line structures holding emergency lighting for the substation. The 6 foot (minimum height) fence surrounding the substation would be partially buried and topped with barbed wire. A photo of a typical collection substation is shown in **Figure 2-6.**

Breakers automatically interrupt power flow on a transmission line at the time of an electrical fault. The type of breaker planned for the proposed substation, called a gas breaker, would be insulated by special

non-conducting gas (sulfur hexafluoride [SF_6]). Small amounts of hydraulic fluids would be used to open and close the electrical contacts within the breaker.

Construction

The collection substation area would be surveyed, cleared, and graded prior to installation. The surface would be graded in compliance with storm water control plans and other applicable permit requirements. Gravel would be delivered to the site after all subsurface work is complete (grounding, equipment foundations, etc.) and leveled to create a surface for the installation of the above ground substation equipment as described above. The substation equipment would be delivered on tractor-trailer trucks and installed on top of a concrete foundation in the graveled area. Three 25-foot tall wood transmission line poles would be buried in the ground to an appropriate depth using an auger. The main power transformer would have secondary containment (concrete) for spill prevention in accordance with the design, applicable codes and the SPCC plan. All areas would be graded to ensure proper drainage and runoff control in accordance with applicable regulations.

Operation and Maintenance

The collection substation would be maintained by operations personnel throughout the year. The fenced yard would accommodate approximately five pick-up trucks that would allow for visits by contractors or Burleigh County Wind personnel.

SF_6 is a greenhouse gas. The use, storage and replacement of SF_6 would be monitored and managed to minimize any releases to the environment. SF_6 gas in substation circuit breakers would be contained within sealed units. Equipment as delivered from the manufacturer would be required to be factory-tested and certified not to leak. After installation, the equipment would be scanned for detection of leaks, and repairs made as appropriate. During use, the equipment would be monitored by periodic substation inspections for indications of leakage. During servicing, SF_6 gas would be evacuated using sealed gas containment equipment, thereby remaining totally contained.

Burleigh County Wind Laydown Yard

During construction, a laydown area would serve as the temporary storage location for power structures, conductor spools, turbine parts, and other transmission line materials and equipment. The long term use of this area would include temporary staging for maintenance operations.

Figure 2-6
Typical Substation Photograph
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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Construction

This area would require partial clearing and grading, which would be completed in compliance with local, state, and Federal regulations. Where gravel would be required, the area would first be stripped of topsoil for use in final leveling of the site.

Operation and Maintenance

The laydown area would require periodic maintenance including grading and installation of gravel for repairs. Erosion and weed infestation would be controlled.

230-KV HIGH VOLTAGE TRANSMISSION LINE

Central Power would construct, own, and operate a new 4.4-mile, 230-kV high-voltage transmission line between the new collection substation at the Burleigh County Wind Energy Center and the interconnection at Western's Garrison-Bismarck 230-kV Transmission Line. The line would have the capacity to carry more than 300 MW and would facilitate the maximum transmission of up to 50 MW (annual average) of output from the Wind Energy Center to the power grid. An illustration of the line and various components is shown in **Figure 2-7**.

Components

The 230-kV high-voltage transmission line would cross U.S. Highway 83 and the Canadian Pacific Railroad. The minimum structure distance from the highway would be 67 feet and the minimum height of the conductor above the highway would be 30 feet. At the railroad crossing, the minimum structure distance from the track would be 55 feet and the minimum distance from the track to the conductor would be 33 feet. Construction, operation, and maintenance would occur within a 133-foot wide corridor. Steel poles on drilled pier concrete foundations would be used for all structures installed within the corridor. Following are the details:

Power Structures

Poles would be approximately 30 inches in diameter at the base and approximately 75 feet tall. Tangent poles would be fastened to 4-foot-diameter drilled concrete pier foundations via anchor bolts for small angles, and to a 6-foot foundation for large angles and dead-ends. Photographs of the structures, including poles and foundations, are shown in **Figure 2-7**.

These spacing standards would require approximately 11 to 12 structures per mile of transmission line. The precise spacing and number of structures required is dependant on final engineering and design, which would incorporate measures to account for topography and generally avoid sensitive sites such as wetlands.

Conductors

The line would consist of three conductors and an optical groundwire (OPGW). Electrical conductors are the wires on which electrical energy flows. The conductor consists of strands of reinforced steel cable encased by aluminum strands. The steel cable provides the tensile strength to support the conductor and the aluminum conducts the electrical current.

The OPGW would consist of an overhead galvanized steel groundwire with enclosed 24-fiber, fiber optic wire. The OPGW would be installed on one side of the top of the structure to provide lightning protection. The fiber optics would be used for utility data communications. **Table 2-2** summarizes transmission line design characteristics for the proposed 230-kV transmission line.

TABLE 2-2
230-kV Overhead Transmission Line Design Characteristics

Design Element	Characteristic
Line length (approximate)	4.4 miles
Width of construction corridor	133 feet total
Width of operational corridor	133 feet total (typically 37 feet road side and 96 feet field side)
Thermal capacity for 230 kV	900 amps
Voltage	230 kilovolts
Circuit configuration	Vertical stacked (3)
Conductor size	795,000 circular mil ACSR 26/7
Conductor type	Aluminum Conductor Steel Reinforced
Electric field at edge of 100-foot operational corridor	0.2737 kV/meter (3 feet above ground)
Magnetic field at edge of 100-foot operational corridor (thermal limit)	11 milligauss (3 feet above ground at 40 megavolt ampere)
Electrostatic short-circuit current limit	7.7 kiloamp for 1 second
Dead-end and Angel Structure Type	Steel pole on 6 foot diameter drilled pier concrete foundation
Tangent Structure Type	Steel pole on 4 foot diameter drilled pier concrete foundation
Number of Structures per Mile	Average of 11 to 12
Structure height	85 feet above ground level (typical)
Length of span	508 feet (average)
Minimum ground clearance of conductor	26 feet at 212 degrees Fahrenheit
Typical structure base dimensions	30-inch diameter
Maximum permanent disturbance at each structure base	7 feet by 7 feet

Typical Conductor Connections

Concrete Foundation

Example of Line Installed Along Right of Way

Figure 2-7
Proposed 230-kV Transmission Line
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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Conductors would be connected to the structures at a minimum height of 40 feet and maximum height of 82.5 feet. Between structures, the conductors would sag under their own weight. The minimum distance to the ground would be 26 feet.

Insulators and hardware used on the line would be standard design to minimize audible noise, and radio and television interference. The typical configuration would involve three vertical stacks of polymer insulators.

Construction

Construction activities typically occur in the following order:

Equipment Delivery and Storage – Central Power would accept construction materials at the Burleigh County Wind Laydown Yard and collection substation site. If possible, the poles would be drop staked at their final location to minimize vehicle traffic and handling. In addition, materials and equipment required for construction of the line would occupy approximately 2 acres of the Burleigh County Wind Laydown Yard and collection substation site. Temporary disturbance for construction would be limited to and area of 50 feet by 50 feet. Permanent disturbance would be limited to the area of ground disturbance at each structure location no larger than 7 feet by 7 feet (less than 50 square feet). No new road construction would be required.

Steel-Pole Foundation Construction – Vegetation would be removed from a limited area at structure locations. An approximately 50 foot by 50 foot disturbance area around the structures would result from the construction of each tower foundation. Once vegetation is removed, holes would be drilled for structures using a truck-mounted auger. The holes would be approximately 14 to 25 feet deep and would range in diameter from 48 to 78 inches. A steel anchor bolt cage and approximately 7 to 31 cubic yards of concrete would be placed into each hole. The concrete footings would be exposed approximately one foot above the ground surface. The footings would be backfilled with 1.5-inch rock and tamped into place to prevent structure movement or settling. Material excavated from the holes would either be used for other project components or disposed in accordance with landowner wishes. Disposal of waste material, including concrete spoil, would be conducted offsite in compliance with all applicable regulations and would not include placement in wetlands or aquatic sites.

Steel-Pole Transportation and Assembly – The steel-pole structures would be transported to the erection sites on flatbed trucks. After adequate curing time for the tower foundations, the contractor would use a semi-truck mounted crane to set the steel poles on the foundations. Crews would bolt the structures to the

foundations, and then follow with a 100-foot reach bucket truck to install suspension insulators and stringing sheaves (conductor and static attachment hardware).

Stringing the Line - After the poles have been erected, conductors would be installed by establishing stringing setup areas within the corridor. These stringing setup areas would be located approximately every 2 miles along the route. Conductors would be installed between setup areas using a "controlled tension method," which ensures that the cable comes off the reel at a constant tension. Conductor stringing operations would also require brief access to each structure to secure the conductor wires to the insulators or shield wire clamps once final line sag is established.

Stringing equipment generally consists of wire pullers, tensioners, conductor reels, shield wire reels, and sheave blocks. Stringing operations consist of pulling lightweight cables or ropes through the stringing sheaves located at every structure site. This cable or rope would be used to pull the conductors through the sheaves under sufficient tension to keep the conductor from coming into contact with the ground. An illustration is provided in **Figure 2-4**.

Temporary guard structures would be installed over existing distribution or communication lines, streets, roads, highways, railways, or other obstacles to keep the conductors from contacting obstructions or causing hazard to transportation routes. This also protects the conductors from damage.

Once the line is complete, temporary structures would be removed, remaining holes backfilled with excess excavated material, and the area of disturbance re-contoured and reseeded with native species as available, or other species at the landowners' request. Reseeding would be conducted in accordance with Western's *Construction Standard 13, Environmental Quality Protection* (Western 2001) (**Appendix B**), requirements and applicable local, state and Federal regulations.

Operation and Maintenance

Central Power would conduct periodic inspections and maintenance on the 230-kV high-voltage transmission line. Crews would use existing ROWs and easements for access.

Temporary Tap

Western would construct a tap to temporarily interconnect the proposed 230-kV, high-voltage transmission line with Western's Garrison-Bismarck 230-kV Transmission Line. The point of interconnection would be located approximately 3 miles south of the town of Wilton (**Figure 2-1**). The tap would be used until a permanent switching station could be constructed. In the meantime, faults could

only be cleared by opening breakers at the existing Garrison or Bismarck substations or the proposed Burleigh County Wind collector substation.

Construction

The tap structure would consist of a four-pole wood structure with guywires (guys) anchored to the ground. The structure would occupy an approximately 10 feet by 16 feet area. The guys would extend an additional 25 feet from the line. At the top of the structure would be one steel switch frame and one 230-kV disconnecting gang-operated manual switch. An illustration of the tap components and dimensions is shown in **Figure 2-8**.

Activities associated with construction of the temporary tap would include:

- Assembling the four-pole wood structure with guys, anchors, and a steel switch frame. The 230-kV disconnecting gang-operated switch would be installed on the steel switch frame. A handle operated mechanism would be mounted on the wood structures. The steel switch frame and 230-kV disconnecting gang-operated manual switch would be assembled on the ground at the site of the temporary tap;
- Excavating four holes to receive the structure. Each hole would be drilled with an approximately 24-inch diameter auger;
- Installing wood poles using a crane. Excess soils would be compacted around the poles to ensure stability of the structure and drainage away from the structures. Soils would be salvaged when the tap is removed and the permanent substation is operational.
- Attaching the steel switch frame to the wood structure and switch components to the steel switch frame using a crane;
- Attaching handle operating mechanisms to wood poles;
- Placing two steel switch operating platforms on wood poles:
- Attaching wood poles and anchors; and,
- Installing conductors, insulators, and insulator assemblies to the proposed 230-kV transmission line and the existing Garrison-Bismarck 230-kV Transmission Line. Conductors would be delivered on steel reels and would be attached using a manlift. An outage would be necessary for the final connection into the existing Garrison-Bismarck 230-kV Transmission Line.

The tap would remain operational until the permanent substation is complete. After that, the tap would be disassembled and replaced by a permanent substation (described below). Activities associated with the removal of the tap would include:

- Removing conductors from the structure;
- Disassembling the structure and removing the steel poles from the ground for reuse;
- Backfilling the area using soils from the permanent substation site; and
- Reclaiming the land as describe in the Restoration and Reclamation section of this chapter.

Operation and Maintenance

Maintenance of the tap would be minimal given that the life of the tap would likely not exceed 1 year. General maintenance would be similar to the 230-kV high-voltage transmission line.

Switching Station

It is anticipated that within one year of operation of the tap, Western would construct a permanent, 230-kV switching station to accommodate the interconnection between the proposed 230-kV high-voltage transmission line and the Garrison-to-Bismarck 230-kV Transmission Line. The permanent substation would provide reliability to the existing power system that the temporary tap cannot.

There are three options for the location of the permanent switching station. For the purposes of this EA, the entire area has been analyzed and is depicted in **Figure 2-1.**

Option A – The permanent substation would be located between Western's 49/3 and 49/2 on the Garrison-Bismarck 230-kV Transmission Line transmission line, north of 279th Avenue.

Option B – The permanent switching station would be located south of 279th Avenue, near highway 83. The construction methods under Option B would be the same as for Option A, but would require two transmission structures to connect the switching station to the Bismarck-Garrison 230-kV Transmission Line. The total distance from the new switching station perimeter to the Garrison-Bismarck 230-kV Transmission Line would be approximately 900 to 1,100 feet. These structures would be single-pole steel, double-circuit structures. Construction activities would be similar to those described for the proposed new 230-kV transmission line.

Option C – The permanent switching station would be located south of 279th Avenue. The construction methods under Option C would be the same as for Option A. Construction at this site would require significantly more grading to create a level pad.

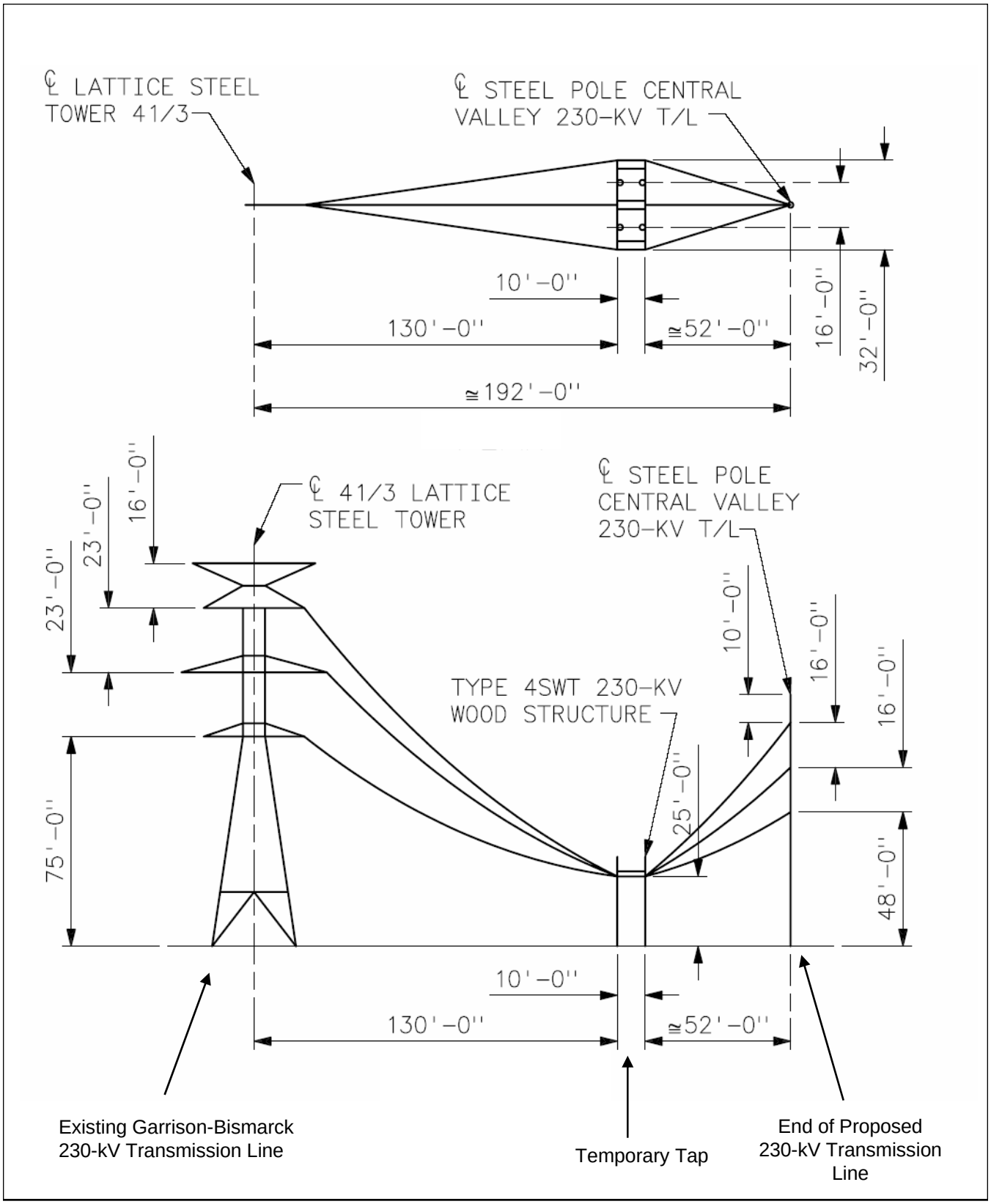

Figure 2-8
Temporary Tap Design Characteristics
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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Construction

The construction of this switching station would be similar to that described for the new collection substation and would include:

- Clearing and leveling an area of approximately 8 to 14 acres of land. Site grading would use on-site soils. Excess soils are not anticipated. In the case of the switching station location Option C, a considerable amount of fill would be required to make the location level. If selected, the fill would come from an approved source or commercial supplier to ensure that it is eligible and that cultural resources would not be affected
- Constructing an approximately 6- to 12-acre gravel surface designed to drain into an adjacent borrow ditch. The area would be graded in accordance with the design, applicable codes, and a stormwater runoff plan.
- Installing a 7-foot-high chain link fence topped with three barbed wires. An access gate would be installed on the side nearest the access road. This yard would contain the switching station equipment. Access during construction and maintenance would be secured and limited to authorized personnel.
- Installing power circuit breakers (similar to those used for the substation) and associated disconnect switches and instrument transformers.
- Installing a bus system on steel structures to link the 230-kV equipment to the existing transmission line.
- Installing a fiber-optic line connected to existing communication lines along the Bismarck-Garrison 230-kV Transmission Line.
- Constructing a control building and associated equipment within the fenced yard.

Operation and Maintenance

The new switching station would be owned, operated, and maintained by Western. Crews would periodically visit the switching station for inspections, as well as routine and emergency maintenance. Maintenance of circuit breakers would be similar to that of circuit breakers at the proposed substation.

CONSTRUCTION WASTE MANAGEMENT

Debris associated with construction may include construction materials such as packaging material, crates, reels, and parts wrapping. This debris may also include excess excavated soil and removed

vegetation. Materials with salvage value, including conductor reels, unused conductor and hardware, poles, and other materials, would be removed from the site for reuse. Excavated spoils would be back-filled within the area of permanent disturbance and restored in compliance with applicable guidelines as described in the Restoration/Reclamation section of this chapter.

If necessary, solid waste, including topsoil or other excavated materials not otherwise disposed of, would be temporarily stored within the corridor or within the temporary construction easements, and then transported to appropriate disposal facilities in accordance with Federal, state, and local regulations.

RECLAMATION AND RESTORATION

Following construction, areas not maintained as permanent facilities would be reclaimed for their prior land use. Reclamation would initially consist of grading to replace the approximate original contour and drainage of disturbed areas. Grading would include removal of any temporary crossing or drainage control structures. Following grading, salvaged topsoil would be spread and blended with adjacent areas to provide a growth medium for vegetation. Soil that has been compacted by equipment operation would be tilled to alleviate compaction and prepare a seed bed. Where natural regrowth of vegetation is not anticipated, disturbed areas would be reseeded in accordance with landowner agreements or with regionally native species. Trees greater than 6 inches diameter at breast height removed during construction operations would be replaced within the project area at a 3:1 ratio. Noxious weeds would be controlled in accordance with state regulations. Pesticides or herbicides would be used in accordance with label specifications and would not be used near aquatic systems without NDDoH approval. Where possible, farming activities would resume in those areas temporarily disrupted by the construction of the Wind Energy Center. In the event farmable land is lost due to project construction, landowners would be compensated.

PERMITS AND COMPLIANCE STANDARDS

Prior to construction, Burleigh County Wind would ensure compliance with Federal, state, and local environmental permits (see **Table 2-3**).

TABLE 2-3
Environmental Permits/Approvals

Permit/ Approval	Issuing Agency/ Entity
Section 404 Clean Water Act - Nationwide Permits 12 and/or 33 (wetlands disturbance)	US Army Corps of Engineers
Article 69-06: Energy Conversion and Transmission Facility Siting Act (transmission line >115kV)	North Dakota Public Service Commission
Spill Prevention, Control and Countermeasure Plan (SPCC)	Environmental Protection Agency (EPA) and North Dakota Department of Health Environmental Health Section
North Dakota Permit for Construction Activity and North Dakota Water Pollution Control Act (NDR10-0000)	Environmental Protection Agency (EPA) and North Dakota Department of Health Environmental Health Section
National Historic Preservation Act and North Dakota State Regulations	North Dakota State Historic Preservation Office (SHPO)
Native American Graves Protection and Repatriation Act	Affected tribes in the region
Railroad Crossing Permit	Canadian Pacific Railway
Highway Crossing and Hauling Permits	North Dakota Department of Transportation
Zoning, Conditional Use Approval	Local Townships

ENVIRONMENTAL PROTECTION MEASURES

Burleigh County Wind, Central Power, and Western would comply with the provisions defined in Western's *Construction Standard 13, Environmental Quality Protection* (Western 2001) (**Appendix B**). Burleigh County Wind and Central Power would also use the Avian Power Line Interaction Committee (APLIC) *Suggested Practices for Raptor Protection on Power Lines* in the design of the overhead portion of the 34.5-kV overhead collection line and 230-kV overhead transmission line respectively (APLIC 1996).

In addition to the provisions contained in these documents Burleigh County Wind, Central Power, and Western would further minimize impacts during construction by implementing the following measures:

- Unless otherwise permitted or approved, Burleigh County Wind, Central Power, and Western would avoid all sensitive resources during siting, construction, maintenance, and operations.
- Burleigh County Wind would consult with interested tribes to develop additional measures to protect TCPs, such as protective easements, in agreement with underlying landowners.
- Crews would use silt fencing, straw bales, and ditch blocks during access road construction and electrical line trenching on sloped ground or at ephemeral drainage crossings within the project area to further minimize erosion and related environmental impacts.

- Security lighting for on-ground facilities and equipment would be down-shielded to keep light within the boundaries of the site. This would minimize attracting night migrating birds to the substation or turbine locations during inclement weather conditions. The USFWS would be consulted regarding the specific down-shielding measures employed prior to installation.

- East-west oriented 34.5-kV overhead collector lines, ground wires, or shield wires and the entire length of 230-kV overhead transmission line would be marked with state-of-the-art line marking devices to minimize bird collisions with overhead lines.

- Conduct operations at the turbine array in accordance with FPL Energy's Wildlife Procedures Manual for dealing with dead and injured wildlife as provided to USFWS. The purpose of this manual is "to standardize the actions taken by FPL Energy in response to any wildlife fatalities and/or injuries found within the windplant boundaries". The manual is similar to the Avian Protection Program developed by USFWS and the Avian Power Line Interaction Committee. This manual requires the following:

    - Dead wildlife found within the turbine array boundary, regardless of cause of death, would be reported immediately to the on-duty Plant or Site Supervisor;
    - The supervisor would complete an incident report and take photographs; and,
    - The Wildlife Program Manager would be notified and further actions would be determined at that time based on the species and the circumstances surrounding the incident.

- Conduct post construction avian and bat mortality monitoring during the first year of commercial operation (2006) using methods developed in coordination with USFWS. This monitoring will include the following:

    - Six surveys of the array would be conducted and consist of two surveys in the spring, summer, and fall;
    - Half of the turbines in the array (alternate turbines) would be surveyed such that turbines not sampled in one visit would be surveyed in the subsequent visit. This would ensure that each turbine is surveyed a minimum of three times;
    - Observer efficiency trials would be conducted to quantify observer bias resulting from several factors, including innate ability, subtle differences in vision, previous experience, and attentiveness; and,
    - Results would be reported to the USFWS within 90 days of the final site survey.

- Introduction of noxious weeds would be mitigated through prompt revegetation with regionally native species or restoration of prior land use. A Clean-Vehicle Program will be initiated which will require the inspection and washing of vehicles and construction equipment from outside the project area to remove adhered soils and plant debris prior to entry into the project area.
- Vehicle speeds of no more than 15mph would be required to minimize dust and wildlife collisions;
- Roads would be watered during construction to minimize dust;
- Signs will be installed where construction vehicles frequently enter or exit US Highway 83 and State Highway 36. Signs will be installed in consultation with the NDDOT; and,
- Wetlands would be flagged to ensure avoidance by a minimum of 50 feet, unless disturbances are permitted through USACE. All construction activities impacting non-jurisdictional wetlands would be conducted in accordance with the methods approved by the USACE for jurisdictional wetlands and impacts would be similarly mitigated.

PROJECT ALTERNATIVES

NO ACTION ALTERNATIVE

There are two sub-alternatives under the No Action alternative:

a) The applicant would not submit interconnection or transmission service agreement requests to Western.

b) Western would not approve the interconnection or transmission service agreement requests.

Under either scenario above, no aspect of the project would be built. As a result, no disturbance would occur and there would be no effect to the environment. Western would continue to operate and maintain the Garrison-Bismarck 230-kV Transmission Line and associated facilities.

Environmental impacts from construction, operation, and maintenance associated with the Proposed Action would not occur. Environmental conditions, as described in the affected environment would be expected to persist in their existing dynamic state.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Early planning for the proposed Wind Energy Center considered delivering power from the Wind Energy Center to a substation on the west side of the Missouri River. This alternative would have required construction of a 230-kV transmission line approximately 28 miles in length and would have included crossing the Missouri River. This alternative was determined not to be feasible by the applicant, and has been dismissed. The alternative has been dismissed from further consideration.

CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the existing environment and potential impacts to resources resulting from the construction, operation, and maintenance of the proposed Burleigh County Wind Energy Center.

The project area is shown in **Figure 3-1**. All proposed facilities are within the Proposed Action area. The general project area outlined represents the area of impact analysis for the majority of the discussed resources; however, study areas associated with several resources discussed in this chapter are more resource specific. These individual study areas were determined through review of potential direct and indirect impacts from the Proposed Action and are defined in the individual resource discussions.

Critical Elements of the Human Environment, as defined and specified in statutes or executive orders, must be considered in an EA. The critical elements that could be impacted by the Proposed Action include:

- Geology and Soil;
- Air Resources;
- Water Resources;
- Vegetation;
- Wetlands;
- Wildlife;
- Endangered, Threatened, Proposed, and Candidate Species, as well as Designated Critical Habitat;
- Socioeconomics;
- Environmental Justice;
- Land Use;
- Visual Resources;
- Noise;
- Safety and Health Issues;
- Cultural Resources; and,
- Native American Religious Concerns.

Preliminary analysis indicated that the Proposed Action would not affect other critical elements of the human environment (as listed below). Justifications for dismissal of these elements from further discussion in this EA are provided in the following paragraphs.

Floodplains – No 100-year or 500-year floodplains occur within the project area.

Paleontology – Investigations of public maps and local geology did not identify any fossil collection sites in the immediate vicinity of the project area.

Wild and Scenic Rivers – Review of the pertinent U.S. Department of Interior National Park Service Web site indicated that there are no Federally designated Wild and Scenic Rivers in North Dakota.

Wilderness – The nearest Federally designated wilderness area to the proposed Burleigh County Wind Energy Center is the Chase Lake Wilderness Area, a 4,155-acre isolated alkali lake located approximately 65 air miles to the east.

Recreation – The Proposed Action would not occur within designated recreation areas. The Proposed Action would not increase public accessibility to any previously inaccessible areas.

An environmental impact is a change in the status of the existing environment as a direct or indirect result of a proposed action or no action alternative. Impacts can be direct or indirect (direct impacts are those that are a result of construction, operation, and/or maintenance, whereas indirect impacts generally occur following construction and may not be directly related to the project); positive (beneficial) or negative (adverse); and permanent or long-lasting (long-term) or temporary (short-term). Short-term impacts are generally associated with the construction phase of the Proposed Action, while long-term impacts remain for the life of the project and beyond. Measures that would be implemented to reduce, minimize, or eliminate impacts (mitigation measures) are discussed under each resource.

Impacts that would result from implementation of the Proposed Action and alternatives are described herein. The alternative temporary tap locations (Options A, B, and C) would only have notable differences in resource impacts for geology and soil and cultural resources.

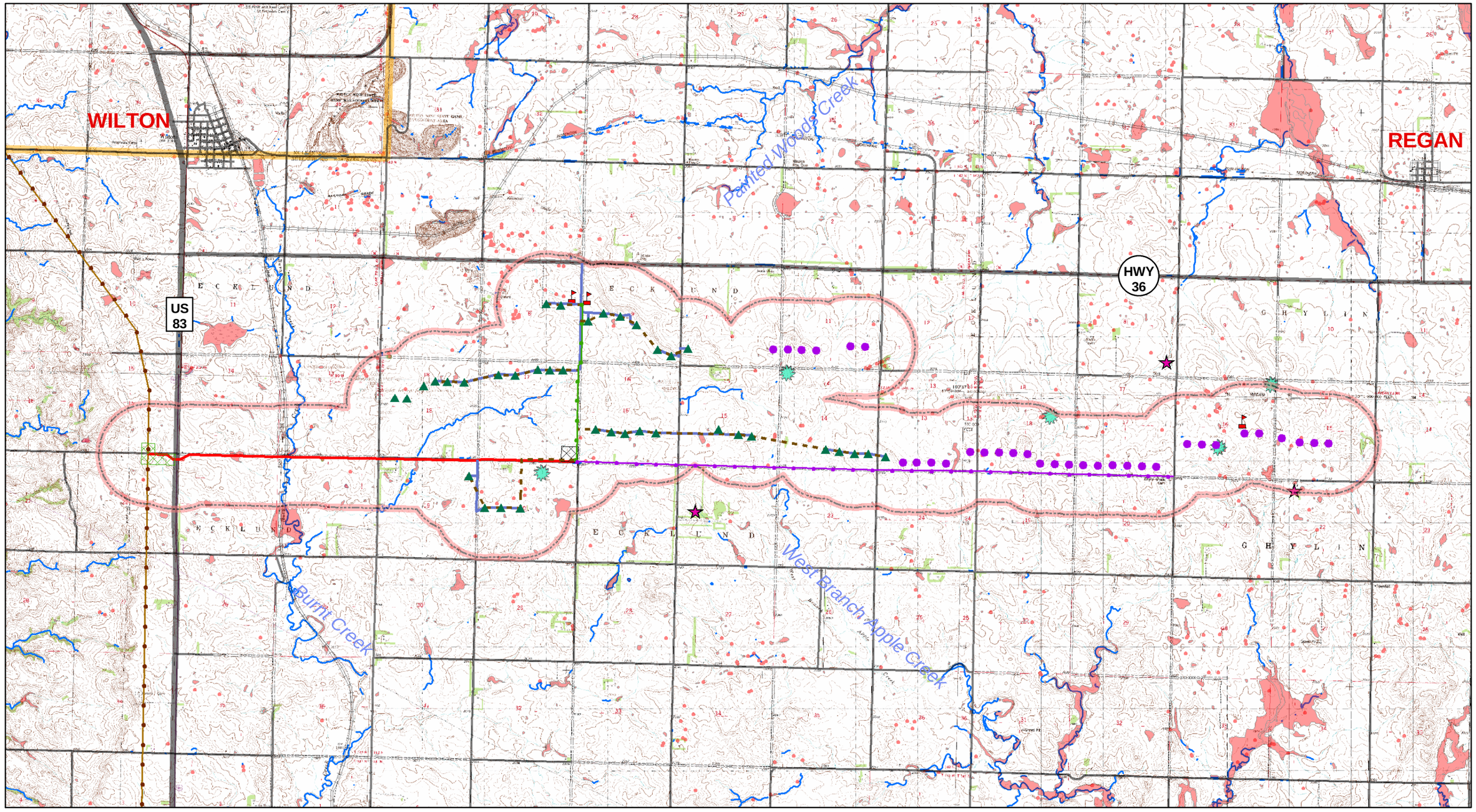

Figure 3-1
Wetlands and Biological Resources
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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PHYSICAL RESOURCES

GEOLOGY AND SOIL

The following is a discussion of the geology and soils impacted by the Proposed Action. Impacts to geology are discussed on a regional scale, while the discussion of impacts to soils is focused on the project area.

Existing Environment

Burleigh County lies within the Missouri River Trench, Coteau Slope, and Missouri Coteau physiographic districts of the Glaciated Missouri Plateau Section. However, the project area is completely contained within the Coteau Slope district (Kume and Hansen 1965).

The physiography of south-central North Dakota has been affected by glaciation. Continental glaciers have advanced and retreated several times in the past 2 million years. Glaciers deposited unsorted sediments, or glacial till, in layers up to 30 meters thick on top of sedimentary shale and sandstone bedrock of the Bullion Creek Formation (formerly referred to as the Tongue River Member of the Fort Union Formation) and Cannonball Formations in Burleigh County (Bluemle 1973; Bluemle 1991).

All glacial till deposition occurred during the Wisconsinan Glaciation. These till deposits are assigned to the Quaternary Coleharbor Formation and account for the majority of the surface geology in the project area.

Much of the project area and surrounding vicinity is characterized by undulating topography with gentle relief typical of the Coteau Slope district. This topography resulted from glacial till deposits thick enough to mask underlying bedrock topography but not so thick as to form large hills and depressions when glacial ice melted.

According to the North Dakota Geological Survey (Bluemle 1991), North Dakota is located in an area of very low earthquake probability. There are no known active tectonic features in south-central North Dakota and the deep basement formations underlying North Dakota are expected to be geologically stable.

Soils in the project area are grassland soils (Mollisols) typical of the Missouri Coteau and Coteau Slope (USDA 1974). Soils of the glacial uplands tend to be well drained, fine- to medium-textured loams, while poorly drained fine-textured soils are found in the morainal depressions (potholes and wetlands).

The majority of the soils within the project area are moderately susceptible to water erosion on sloping topography. Erosion occurs most frequently following cultivation or other surface disturbance that removes the upper soil horizon, exposing subsurface horizons.

Most of the soils in the project area (90 percent of the surface area) have low to moderate susceptibility to wind erosion (i.e., USDA Wind Erosion Groups 6 or greater). The remaining 10 percent of the project area is covered by soils with moderate to high susceptibility (i.e., USDA Wind Erosion Groups 4L and 3).

There are no known metallic mineral deposits or oil fields in the project area (Bluemle 1991, Bluemle 1992). Sand and gravel deposits are common in glaciated areas of the Coteau Slope and Missouri Coteau, but the quality of these deposits is variable (Bluemle 1991). Some small open aggregate pits are found in the project area, but are limited in extent and are not immediately adjacent to any proposed facilities.

Lignite (coal) was recovered from mining operations dating back to 1920 in the project area. Surface mining for lignite continued through the late 1960s; however, there are no active mines in the project area (Lou Ogart pers. comm. 2005). The high stripping ratio, relative to other deposits in the state, makes reserves in the area less suitable for development (Ed Murphy, State Geologist, North Dakota Geological Survey, June 20, 2005). Thick lignite deposits, best suited to coal-bed methane development, are generally not found in Burleigh County (Ed Murphy pers. comm. 2005).

Environmental Consequences

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

Because of the gentle relief in the project area and the deliberate siting of facilities on level terrain, the potential for soil loss due to erosion would be low. However, construction of switching station Option B would require more grading than options A or C, and the steep slopes associated with the cut and fill areas may be prone to erosion. Should Option B be selected, implementation of environmental protection measures described in Chapter 2 of this document would minimize erosion of these areas.

The Proposed Action includes restoration of disturbed areas to pre-construction conditions. Soil erosion, compaction, and other related disturbance would be short-term, and would be minimized by implementing environmental protection measures. With the proper implementation of environmental protection measures intended to prevent, minimize, and/or reclaim soil erosion, compaction, and spill

effects, no unmitigated loss of highly productive soil would result from implementation of the Proposed Action.

Sand and gravel are normally mined near the location of their final use. It is likely that any future need for these resources could be met by deposits in other areas.

AIR RESOURCES

The impact analysis for air resources is limited to the vicinity of the project area (**Figure 3-1**).

Existing Environment

The entire state of North Dakota is in attainment of all state and Federal air quality standards (Tom Bachman pers. comm. 2005). Within the project area, minimal effects to air quality are likely to occur due to existing emission sources such as vehicles, trains, and agricultural equipment. Although relatively high concentrations of total suspended particulates (dust) likely occur in springtime from farming operations and high wind, these are not likely to exceed National Ambient Air Quality Standards (NAAQS).

Environmental Consequences

A significant impact to air resources would result if Federal or state air quality standards were exceeded during construction, maintenance, or operation of the Proposed Action. Vehicle movement during construction activities associated with the Proposed Action may temporarily affect air quality in the project area. Temporary emissions would include nitrogen oxides, hydrocarbons, carbon monoxide, and sulfur dioxide from vehicles, equipment, and machinery. These impacts would be short-term, and are not expected to cause an exceedence of state or Federal air quality standards. Circuit breakers would be sealed and certified to not release SF_6 gas. At the time of servicing, SF_6 gas would be evacuated using sealed gas containment equipment, thereby remaining totally contained.

Air quality effects caused by dust would be short-term, limited to the time of construction, and would not exceed the aforementioned NAAQS particulate standards. The North Dakota Department of Health (NDDoH) Air Quality Program does not require a permit for the project and has stated that the Proposed Action is unlikely to result in the exceedence of air quality standards (Tom Bachman pers. comm. 2005). The limited duration of construction, along with implementation of the environmental protection measures presented in Chapter 2 of this document, is expected to mitigate air quality effects so that

Federal and state standards would not be exceeded. Complaints regarding fugitive dust emissions would be addressed in an efficient and effective manner.

WATER RESOURCES

The following discussion of water resources includes descriptions of the surface water, groundwater, and wetlands found within the project area (**Figure 3-1**).

Existing Environment

Surface Water

Surface water resources within the project area include wetlands and ephemeral drainages (i.e., drainages that only flow for short periods of time during the year). Limited open water is available within the project area. Two main watersheds comprise the project area: Burnt Creek and the West Branch of Apple Creek (**Figure 3-1**). A third watershed, the Painted Woods Creek watershed, drains the northernmost portion of the project area. These drainages are ephemeral and typically maintain flows in the spring of the year or in response to precipitation events. Overland flow during storm events is low due to undulating topography and permeable soil underlying the project area.

Stock ponds, reservoirs, and dugouts (i.e., excavated water impoundments) are present throughout the project area and are generally less than 1 acre in size. The majority of seeps and springs are found in association with dugouts, as well as temporarily and seasonally flooded palustrine emergent wetlands. These features are further discussed in the wetlands section presented later in this analysis.

Wetlands

Wetlands are important because they perform hydrologic (e.g., flood attenuation, surface water, groundwater recharge) and water quality (sediment retention, pollution control) functions (Novitzki et al. 1997). Wetlands also provide valuable habitat for species of special interest (e.g., migratory birds) and special status (e.g., State or Federally listed endangered, threatened, proposed, and candidate species, or species of conservation concern) discussed later in this chapter.

“Waters of the U.S.,” as defined by Section 404 of the Clean Water Act (1973), are within the jurisdiction of the USACE. Jurisdictional waters within the project area are regulated by the USACE-Omaha District.

Waters of the U.S. include both wetlands and non-wetlands that meet USACE criteria. USACE has determined that a jurisdictional wetland must have a predominance of hydrophytic vegetation, hydric soil, and wetland hydrology, and be connected to waters of the U.S.

A 2001 U.S. Supreme Court decision removed "isolated wetlands" from USACE jurisdiction (*Solid Waste Agency of Northern Cook County vs. USACE*). Isolated wetlands are those that have no connection with any tributary system that flows into traditional navigable water or interstate water (i.e., intrastate lakes, streams, prairie potholes). This decision does not alter state or tribal jurisdiction over wetlands, and regulatory authority over isolated wetlands varies from state to state.

The DOE has developed floodplains and wetlands environmental review requirements as presented in 10 CFR, part 1022. This applies to actions implemented under DOE purview that may involve floodplains and/or wetlands.

Wetland resources were evaluated within the project area (**Figure 3-1**). A thorough survey for wetlands was completed for the 2005 phase of the Proposed Action and thorough wetlands inventories would be completed prior to the design and installation of the expansion turbines.

With the exception of a few scattered reservoirs, few wetlands in the project area offer open water habitat. Most are areas of saturated soils located near springs and seeps or simply areas of water accumulation in low-lying areas. Large open water habitats in the vicinity of the Proposed Action include the Missouri River and its reservoirs and various small lakes

The majority of wetlands present within the project area are temporarily and seasonally flooded palustrine emergent wetlands (Cowardin et al. 1979). Water regimes of these wetlands are highly variable, depending on seasonal climatic conditions, topography, and location. Some of these wetlands form in shallow depressions, although most are located in drainages with minimal flow. The wetlands that are located within drainage bottoms may be connected to the jurisdictional waters of the U.S.

Non-jurisdictional wetlands are found outside of main channels in soil types exhibiting poor internal drainage. These wetlands are not common in the project area due to the well-developed drainage patterns found there; however, some wetlands do occur and are generally small in size (0.1 to 0.25 acre), and appear to be ephemeral in nature.

Numerous wetlands within agricultural areas have been converted and are grass waterways or farmed depressions planted in cool season grasses and harvested for hay. Many other wetlands are subject to cattle grazing and many have been excavated to provide more permanent water sources for cattle.

Groundwater

As discussed in the Geology and Soil section, the project area is located within the Coteau Slope physiographic unit, bisecting the Apple Creek Uplands subdistrict and Burnt Creek subdistrict, described by the North Dakota Geological Survey (Kume and Hansen 1965).

Shallow groundwater occurs in the project area. Well logs recorded within the vicinity of the project area show that the regional water table is approximately 50 feet below ground surface (North Dakota State Water Commission 2005). These well logs and others from this portion of Burleigh County indicate a southeasterly flow direction under an average hydraulic gradient of 0.3 percent.

Deeper groundwater resources in Burleigh County are contained within aquifers comprised of water-bearing sandstone, interbedded with shale, mudstone, siltstone, lignite coal, and beds of limestone (USGS 1996). Water quality from these aquifers is typically poor, with high concentrations of total dissolved solids.

Environmental Consequences

A significant impact to water resources would occur if 1) the Proposed Action causes a loss or degradation of wetlands in violation of a USACE permit; 2) the Proposed Action causes an increase in susceptibility to on-site or off-site flooding due to altered surface hydrology; 3) the Proposed Action causes a violation of the terms and conditions of a NDDoH stormwater permit; or 4) the Proposed Action causes a loss or degradation of surface water quality.

The Proposed Action design minimizes disturbances to wetlands through implementation of environmental protection measures and avoidance of wetland habitats during facilities siting. Most construction activities associated with the Proposed Action would be sited outside of ephemeral channels and the depression cone of wetlands. However, the proposed buried and overhead powerlines bisect ditches and ephemeral drainages and construction of these facilities would result in some temporary or permanent disturbances. These disturbances would be permitted, restored and mitigated as required by the USACE-Omaha. Impacts to these resources during construction would be limited to permanent impacts

totaling less than 0.1 acre or temporary impacts and would be authorized by the USACE through either a Nationwide Permit 12 or 33.

Temporary impacts to wetlands may occur where access for construction requires installation of temporary crossing structures at channels, wetlands, or other wet areas. If required at these sites, one of the following four types of temporary crossings would be constructed:

1) Crossings of wetlands with construction equipment using wooden matting;
2) At-grade crossings of non-wetland, dry-bed waters of the U.S. without dredge or fill;
3) Crossings of non-wetland, dry-bed waters of the U.S using geotextile and course rock fill, and;
4) Culverted crossings using geotextile, course rock fill and culverts.

Equipment crossings in wetland areas which do not have defined channels would be restricted to crossing on wooden mats to prevent compression and or disturbance of wetland soils. Non-wetland, dry-bed waters of the U.S. would be crossed without dredge or fill. Areas with water in defined channels would be crossed at temporary, at-grade crossings or culverted crossings to prevent permanent impacts to these areas. Crossing of areas which have a combination of a defined channel and adjacent wetland areas may require the use of wooden mats and installation of a temporary at-grade or culverted crossings. Construction activities would include implementation of the Stormwater Pollution Prevention Plan. Fill material placed below the high water mark would be free of topsoil, decomposable materials, and toxic concentrations of persistent synthetic organic compounds.

Temporary crossings would be inspected after runoff-producing rains to check for blockage in channel, erosion of abutments, channel scour, riprap displacement, or piping. All repairs would be made immediately to prevent further damage to the installation. Temporary crossings would be removed immediately when they are no longer needed. All construction materials (e.g., rock, geotextile fabric, culvert, etc.) would be removed and the site would be restored to its original grade. The disturbed area would be smoothed and appropriately stabilized with silt fence or erosion control blankets as necessary to control erosion. The site would be seeded with local native species adapted to the site conditions as necessary to promote prompt revegetation. Due to the temporary nature of impacts, it is likely that onsite propagules (e.g., living plants and seeds) would regenerate vegetative cover similar to that found prior to the disturbance without additional seeding. Silt fences would remain in place to continue capturing sediment until the crossing site is fully stabilized and revegetated as determined in consultation with USACE. Soils at risk to erosion would be identified prior to disturbance and the need for placement of additional silt fence or erosion control matting would be evaluated and implemented as needed.

Permanent impacts to wetlands would occur where transmission structures or underground transmission line are installed within a wetland. Currently, installation of no more than two transmission structures (each with a permanent footprint of approximately 49 square feet) and no more than 100 linear feet of underground transmission line (with an associated maximum of 400 square feet of permanent disturbance) are planned which would permanently impact wetland areas. The proposed permanent disturbance area of wetlands would not exceed 500 square feet.

Construction activities may disturb soils and vegetation to an extent that would require some regrading and reseeding following completion of operations. Should such disturbance occur, these soils would be smoothed to the original contours and reseeded, if necessary, with native perennial species common to the area. If surface disturbance does not significantly impact vegetation, plants may regenerate or sprout from onsite propagules, thus negating the need for additional revegetation. Routes necessary to maintain access to the site would remain cleared of vegetation and some coarse surface material may be left in place to ensure access is possible during adverse weather conditions. Road surface materials would not be placed in waters of the U.S. and wetlands would not be impacted by regrading or resoiling activities associated with this project as proposed.

Avoidance of wetlands during siting of the turbine locations and ancillary wind generation project facilities, implementation of the environmental protection measures described in Chapter 2 of this document, and compliance with USACE permits and attendant conditions of approval would ensure that there would be no unmitigated loss or permanent degradation of wetlands.

On-site or off-site flooding would not result from the construction and grading of roads and other facilities related to the Proposed Action. Implementation of environmental protection measures such as installation of adequately-sized and appropriately placed culverts, and avoidance of channels and other areas of concentrated flow, would ensure that such on-site or off-site flooding does not occur.

A stormwater runoff permit would be obtained prior to construction. Compliance with this permit and the associated stormwater pollution prevention plan would ensure that surface water is not adversely affected by runoff from disturbances and construction areas.

As with any construction activity, there is a possibility of spilling fuel, hydraulic fluid, or other hazardous substances. The potential of such events would be minimized through implementation of the environmental protection measures described in Chapter 2 of this document. Construction equipment would be equipped with spill cleanup kits. Equipment refueling would take place at secure areas, away

from wetlands or drainages. These measures would ensure that surface and ground water quality is not degraded through spillage of contaminants.

BIOLOGICAL RESOURCES

VEGETATION

The vegetation resources in the project area (**Figure 3-1**) were investigated to assess impacts of the Proposed Action to biological resources. The Missouri River is within 6 miles of the project area, as shown in **Figure 1-1**.

Existing Environment

Land use and land cover mapping was performed using a combination of recent color aerial imagery and field reconnaissance (**Figure 3-2**). These data were used to derive area estimates of land use and cover, including aquatic habitats, within the project area. Land use in the project area is dominated by agricultural uses (75 percent). Also present are grasslands (19 percent); waterways dominated by perennial grasses and forbs (2 percent); woodlands, including forested shelterbelts and wooded drainages (1 percent); aquatic habitats, including streams, ponds, wetlands, and dugouts (less than 1 percent); and disturbed areas, including farmsteads, gravel pits, dams, edges of dugouts and roads (nearly 2 percent).

The Missouri Plateau, River Breaks, and Missouri Coteau Slope ecoregions occur in the vicinity of the Project Area and vary in vegetative characteristics. Native vegetation of the Missouri Plateau is dominated by blue grama (*Bouteloua gracilis*), wheatgrass/needlegrass (*Pascopyrum* spp./*Nassella* spp.) association, little bluestem (*Schizachyrium scoparium),* and prairie sandreed (*Calamovilfa longifolia*). The River Breaks native vegetation is dominated by blue grama, western wheatgrass (*Pascopyrum smithii*), buffalograss (*Buchloe dactyloides*), and some little bluestem. Juniper (*Juniperus* spp.) and deciduous trees are found on north facing slopes and cottonwood (*Populus deltoides*) gallery forests with willow (*Salix* spp.) are located on the floodplain.

Native tracts within the Missouri Coteau Slope (location of Project Area) are generally dominated by western wheatgrass, needle and thread (*Hesperostipa comata*), prairie junegrass (*Koeleria macran),* or green needlegrass (*Nassella viridula*) (USDA 2005). Common forbs species found within the native grassland of the Coteau Slope also includes numerous forbs (e.g., yarrow [*Achillea millefolium*], pussy

toes [*Antennaria* spp.] prairie sagewort [*Artemisia frigida*], purple avens [*Geum rivale*], and milk vetch [*Astragalus* spp.]), and shrubs (e.g., prairie wild rose [*Rosa arkansana*], snowberry [*Symphoricarpos occidentalis*]) (Kantrud and Kologiski 1982, Kuchler 1964).

Large tracts of forest are non-existent within the project area. Woody vegetation is typically present only in drainages and shelterbelts and is highly fragmented throughout the project area. Shelterbelts are typically planted to reduce wind erosion in cultivated areas, accumulate snowfall downwind of shelterbelts to increase available soil moisture, provide wildlife habitat, and protect farmsteads and livestock areas from winter winds. A variety of native and non-native shrubs, deciduous trees, and conifers are used for shelterbelt plantings. Important native woody species found in the region include: cottonwood, aspen (*Populus tremuloides*), snowberry, prairie wild rose, sagebrush (*Artemisia* spp.), willow, and birch (*Betula* spp.).

Agricultural Lands

Agricultural land is the dominant land cover type in the project area. In Burleigh County, the most common crops in production are dry land wheat (primarily spring wheat), sunflower, barley, corn, and hay. Hayland, cropland, and pasture are managed for the production of livestock forage and cereal crops within agricultural tracts.

Grassland

Grasslands within the project area are typically grazed or hayed annually and include native species and mixed (native and non-native) pasturelands. Since the 1800s, 75 to 90 percent of North Dakota's native grasslands have been lost due to cropland conversion. USFWS (Towner 2005) has an interest in native prairie for the following reasons:

- Native prairie provides important habitat for a number of migratory grassland birds, and year round residents;
- Native prairie provides nesting habitat for a variety of waterfowl;
- Native prairie exhibits genetic plant diversity that is important to agriculture and medicine;
- Native prairie provides habitat for a variety of insects; and,
- Native prairie provides opportunities for scientific research and recreation..

This land cover type map was created through airphoto interpretation and partial site review through site reconnaissance. A general review of the cover types and land uses identified is described below:

Agricultural - includes cultivated tracts, tracts in hayland production and other areas managed for high forage production but regularly grazed. These tracts are commonly dominated by introduced species. Areas enrolled in the conservation reserve program may be included in this cover type.

Aquatic - includes tracts largely dominated by aquatic vegetation or inundated with water for a large portion of the year. Not all wetlands are identified as aquatic.

Disturbed - generally includes areas actively disturbed for industrial use or other uses not conducive to vegetation production. Some natural disturbances, such as periodically flooded areas and denuded areas adjacent to aquatic habitats are also included.

Grassland - tracts generally characterized as having low-growing native or introduced grasses and forbs in perennial production. These areas are commonly used for livestock grazing and do not appear to be regularly cultivated in row-crop agricultural or hayland cycles.

Roads - areas of heavy traffic including wide areas of linear gravel or other surfacing as well as two-track trails along section lines.

Waterways - areas bounded by agricultural tracts comprised of perennial grass, forb, and shrub species that control erosion.

Woodlands - shelterbelts and natural shrub and tree stands.

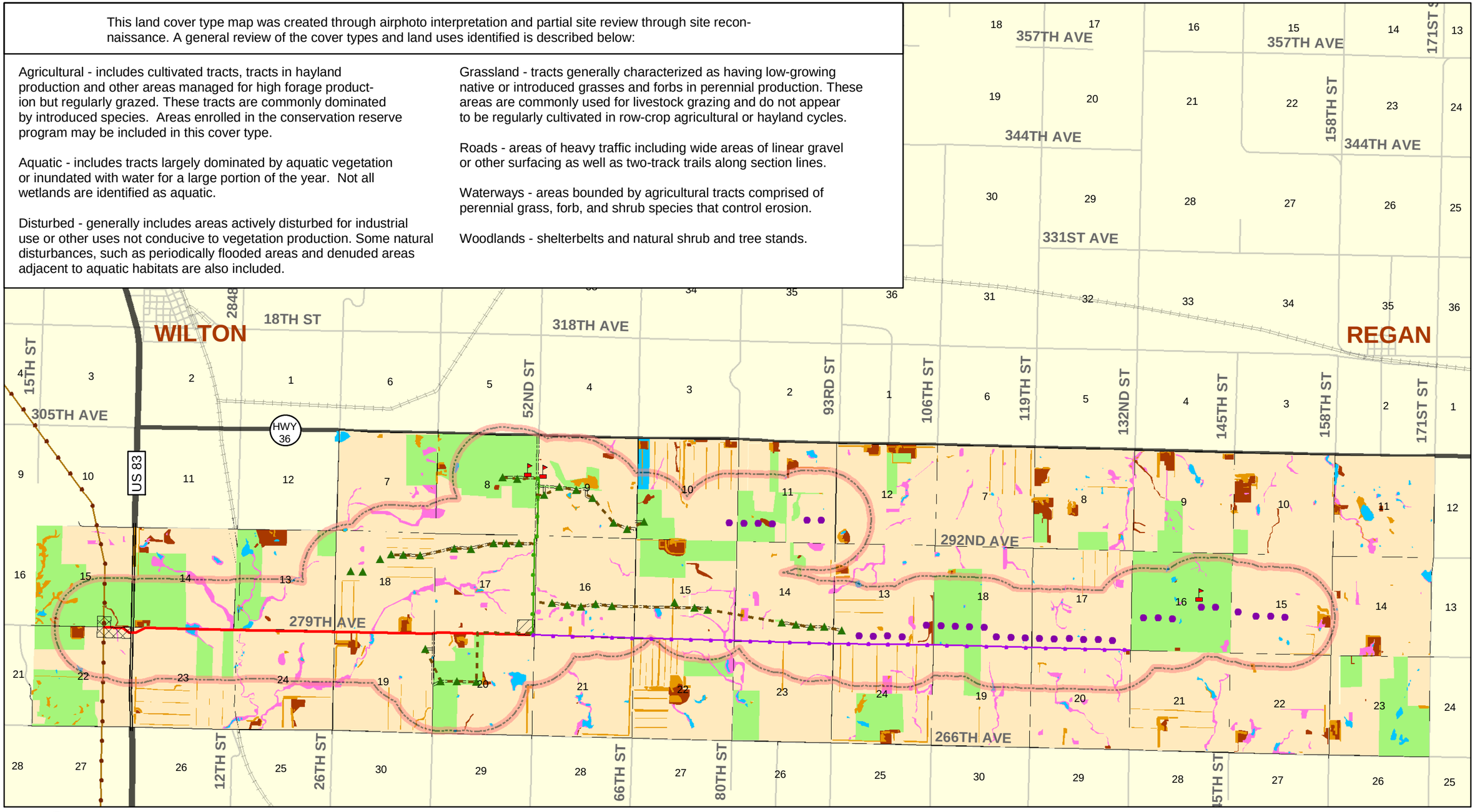

Figure 3-2
Land Use / Land Cover
Burleigh County Wind Energy Center
FPL Energy Burleigh County Wind, LLC

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The USFWS has also stated that shortgrass-prairie provides habitat crucial to sharp-tailed grouse (*Tympanuchus phasianellus*) (Terry Ellsworth pers. comm. 2005a).

Easements and Other Limitations

The USFWS commonly purchases wetland and grassland easements to help preserve habitats critical to migratory birds, native species, and other sensitive species. The easements provide perpetual protection of wetlands within the boundaries of the easement agreements. Within the vicinity of the Proposed Action, only one site is currently held under easement by the Long Lake Wetland Management District. This easement is located outside of the project area.

The USDA-Natural Resource Conservation Service (NRCS) and Farm Service Agency (FSA) administer a number of conservation-based programs for private landowners. The Conservation Reserve Program (CRP) conserves soil and water resources and provides wildlife habitat by removing enrolled tracts from agricultural production, generally for a period of 10 years. While tracts within the project area are enrolled in CRP, the Proposed Action would not result in disturbance of any of these areas.

Forest and Shelterbelt

The limited amount of woody vegetation present provides important nesting and roosting habitat for a variety of bird species. Trees and shrubs are important feeding, roosting, and escape cover for a wide variety of wildlife. Woody species that are particularly important for sharp-tailed grouse include aspen, snowberry, sagebrush, willow, and birch.

Aquatic and Riparian

Aquatic and riparian habitats are disproportionately important to wildlife because they tend to have high species richness and diversity, and often exhibit high vertical habitat diversity. These habitats represent less than 1 percent of the project area (**Figure 3-2**). Riparian areas within the project area are small and are associated with ditches along roads and other modified land areas.

Rare Plant Populations

A request was submitted to the USFWS and North Dakota Game and Fish Department (NDGFD) in March 2005 for information on endangered, threatened, proposed, and candidate plant species or populations that may be present in the project area. An additional request was submitted to the North Dakota Natural Heritage Program (NDNHP) to query their database for known populations of rare plant

species in the vicinity of the Proposed Action. The NDNHP responded that there were no documented occurrences of rare plants in the project area (Tetra Tech, Inc. 2005).

The only plant of special concern in North Dakota the western prairie fringed orchid (*Platanthera praeclara*), which is listed as endangered by the USFWS. This species is only found in tallgrass prairies and sedge meadows, neither of which occurs to a notable extent within the project area. Populations are known to exist well outside of the project area in southeast North Dakota (USFWS 1995). USFWS has determined that this species does not occur in Burleigh County (Terry Ellsworth pers. comm. 2005b). While no specific surveys were conducted throughout the entire project area to determine if the species is present, this species was not incidentally observed during any site visits.

The state of North Dakota does not maintain a list of protected rare plants. However, a listing of plants is maintained by Natureserve in cooperation with the NDNHP. Species on this list are not necessarily reflective of species with imperiled populations, but does include species rare in North Dakota. Those listed as rare in Burleigh County, North Dakota (smartweed dodder [*Cuscuta polygonorum*] and Rocky Mountain iris [*Iris missouriensis*]) are common and abundant elsewhere (G5 status) and as such were not the target of specific rare plant surveys (Natureserve 2005). Native plant populations were observed by biologists during the numerous site surveys in 2005 and no apparent uncommon species or communities were identified.

Noxious Weeds

North Dakota currently designates 12 plant species as noxious weeds. The listed weed species are commonly recognized to harm North Dakota's agriculture, environment, and/or public health. North Dakota Department of Agriculture Century Code, Chapter 63-01.1 states that all local governments must require public and private landowners to manage noxious weeds. The noxious weed list currently includes absinth wormwood (*Artemisia absinthium*), Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), field bindweed (*Convolvulus arvensis*), leafy spurge (*Euphorbia esula*), musk thistle (*Carduus nutans*), purple loosestrife (*Lythrum salicaria*), Russian knapweed (*Acroptilon repens*), spotted knapweed (*Centaurea biebersteinii*), yellow starthistle (*Centaurea solstitialis*), dalmation toadflax (*Linaria dalmatica*), and saltcedar (*Tamarix chinensis, T. parviflora* and *T. ramosissima*). Non-noxious invasive species also include black henbane (*Hyoscyamus niger*), hoary cress (*Cardaria draba),* St. Johnswort (*Hypericum* spp.), and yellow toadflax (*Linaria vulgaris*). During surveys conducted in the spring of 2005, absinth wormwood and Canada thistle were observed in the vicinity of the project area.

Burleigh County has a weed control program that governs the monitoring and control of noxious weeds on public and private lands. Currently, the county also performs monitoring for black henbane.

Environmental Consequences

A significant impact to vegetation resources would occur if: 1) the Proposed Action resulted in a loss of habitat resulting in the listing of or jeopardizing the continued existence of plant or animal species; or 2) the Proposed Action resulted in uncontrolled expansion of noxious weeds.

Vegetation communities most sensitive to disturbance are native grasslands and wetlands. During the planning phase, access roads and turbine locations would be placed to minimize impacts to wetland areas. Grasslands, a portion of which are largely composed of native species and many of which have been previously farmed, occur across approximately 19 percent of the project area. A portion of these tracts would be disturbed in association with the Proposed Action; however, the disturbances resulting from the Proposed Action would impact less than 1 percent of these tracts. Neither threatened nor endangered plants were observed or previously documented to occur within the project area.

New road construction would also include dust control measures to reduce impacts from dust on adjacent vegetation communities. Introduction of noxious weeds would be mitigated through prompt revegetation with regionally native species or restoration of prior land use and institution of a Clean-Vehicle Program as detailed in Chapter 2 and required by Western's *Construction Standard 13, Environmental Quality Protection* (Western 2001) (**Appendix B**).

WILDLIFE

Although the evaluation of wildlife resources focused on the project area (**Figure 3-1**), some regional discussion is included. This is necessary because of the greater mobility of wildlife and the high usage of the region by migratory birds. Existing literature and other information related to known species distributions, including endangered, threatened, proposed, candidate, and sensitive species; migration pathways; and wetlands and unique habitats within the project area, were reviewed for relevance to the Proposed Action. When necessary, appropriate agency personnel were interviewed via telephone or in person to collect information about the project area relevant to this study.

Existing Environment

Species lists of vertebrates known or likely to occur on or near the project area were developed through literature review and in consultation with agency personnel. Checklists of North Dakota birds (Stewart 1975; Faanes and Stewart 1986), mammals (Grondal no date), and amphibians and reptiles (Hoberg and Gause 1992) were available online through the USGS Northern Prairie Wildlife Research Center. Additionally, species lists for Burleigh County were provided by a NDGFD non-game biologist (presented as received in **Appendix C).** The sources yielded general distribution information that aided in developing the species lists for the project area.

Based on the review of these species distribution lists, known wildlife habitat affinities, and site-specific survey data, 7 amphibian, 9 reptile, 68 bird, and 52 mammal species were identified that may occur in the project area. Surveys were conducted during 2005 to document avian and other wildlife use in the project area (Tetra Tech, Inc. 2005). During site survey activities conducted in 2005, 65 wildlife species (53 bird species and 12 mammal species) were observed within or adjacent to the project area (Tetra Tech, Inc. 2005). Locations of raptor stick-nests and sharp-tailed grouse leks found during these surveys are shown on **Figure 3-1**. No site-specific amphibian, reptile, or mammal surveys were conducted within the project area.

Environmental Consequences

A significant impact to wildlife resources would occur if the Proposed Action resulted in the loss of individuals of a population leading to the listing of or jeopardizing the continued existence of animal species. Impacts to wildlife could be short-term (one or two reproductive seasons, generally during the construction period), or long term (affecting several generations during the life of the project). Impacts can be direct (an immediate affect to an individual, population or its habitat), or indirect (an affect that may occur over time or result from other actions).

Construction activities that remove vegetation and disturb soil may cause direct impacts to individuals of less-mobile species (e.g., small mammals, amphibians, reptiles) through direct mortality or displacement and exposure to predators. More mobile species (medium to large mammals and birds) would be expected to disperse from the area of disturbance during construction, returning following completion of these activities.

Disturbance to wildlife from noise, vehicles, and human presence would be localized and short-term in nature. Vehicles traveling access roads could kill small mammals, reptiles, or birds, though more mobile

species would be able to avoid impacts from vehicles. Nests of ground-nesting birds could be destroyed by vehicle traffic if construction activities occur during spring and early summer months when birds are nesting. However, these losses are not expected to cause significant impacts to overall wildlife populations because construction would not occur during the nesting season.

Staging and construction activities associated with the Proposed Action would require access to gravel. Gravel for use during the project would be obtained from currently a active gravel pit near the project site. The selected contractor's current gravel source is located in the East ½ Northwest ¼ Section 27, Township 144 North, Range 80 West. Use of this existing gravel pit would prevent the loss of additional wildlife habitat caused by mining gravel resources near the Project Area.

Construction activities could result in an accumulation of trash and food scraps that may be attractive to scavengers. Scavengers, such as raccoons or ravens, pose a threat to ground-nesting birds or other ground-dwelling wildlife species susceptible to predation. Waste containment measures would be implemented as described in Chapter 2 of this document. All waste material would be secured from scavengers and removed from the construction site daily. Any attraction of scavengers to the construction area would be of short duration and would not affect populations of wildlife in the area.

As part of the Proposed Action, approximately 4.4 miles of 230-kV overhead transmission line and 8 miles of 34.5-kV overhead transmission line would be constructed (**Figure 3-1**). Impacts to individual birds and associated mortality resulting from transmission line facilities interactions may occur. Based on the studies conducted, waterfowl, shorebirds, cranes, and other birds with a high wing loading to low wing aspect ratio (Crowder 2000) appear to be most susceptible to powerline collisions. This is particularly true when powerlines are located near wetlands. In upland habitats, raptors and passerines appear most susceptible to mortality from interactions with wind turbines (NWCC 2004).

To minimize bird collisions with overhead lines, all east-west oriented 34.5-kV overhead collector lines would be marked with state-of-the-art line marking devices. Habitats in the proposed powerline corridors are primarily agricultural row crop habitats, with few aquatic and grassland habitats. The 34.5-kV overhead line portion of the Proposed Action is not expected to bisect daily movement patterns of avian species due to the small amount of suitable habitat located within and adjacent to the proposed powerline corridors. Burnt Creek is a possible exception and may be a communication flyway between areas south of the project area and the Audubon National Wildlife Refuge. The entire length of the proposed 230-kV overhead transmission line, including the crossing of Burnt Creek, would be marked with approved devices in accordance with the manufacturer's recommendation. All 34.5-kV overhead lines that bisect

communication flyways (as observed by project or agency personnel or documented through collisions) would also be marked with state-of-the-art line marking devices.

To minimize the possibility of electrocution on above-ground portion of the collector system ground wires on the 34.5-kV poles would be covered and would not stick up beyond the top of the poles. Pole mounted insulators would be rated for 69-kV.

Mortality to birds resulting from collision with turbines at wind generation projects has been described at other wind generation projects (Nelson and Curry 1995; Osborn et al. 2000; Johnson et al. 2002) and these reports have identified avian mortality due to collisions as an issue. The magnitude of the issue has been described as site-specific. In Minnesota, Johnson et al. (2002) classified 71 percent of documented avian collision mortalities as migrants and 76 percent of those were passerines. Estimated mortality rates for 8-month periods ranged from 0.98 to 4.4 collisions per turbine (ca. 1.5-6.6 collisions/turbine/year), with the highest rate being due primarily to a single mortality event that may have been weather-related (Johnson et al. 2002). Data collected from a number of studies conducted prior to 2004 indicate an average of 2.19 avian fatalities per turbine per year in the United States for all species combined and 0.03 raptor fatalities per turbine per year (NWCC 2004). Avian collisions with turbines may be influenced by such factors as annual migration and local movement patterns, turbine size, and weather.

Avian mortality in association with turbines has been reduced by locating the Wind Energy Center and turbines where birds are less likely to encounter them relative to other areas in the region. While it is possible that there would be impacts to individual birds as a result of collisions with the wind turbines and transmission lines of the Proposed Action, the Wind Energy Center has been situated in an area with a low density of wetlands relative to areas to the north and east and away from the Missouri River corridor, an area of known high avian use (**Figure 1-1** and **Figure 3-1**). Individual turbine towers would be located on ridgelines and hilltops, away from low passes between wetlands where shorebirds and waterfowl are more likely to fly. This would reduce the likelihood of avian collisions.

The Wind Energy Center would use improved turbine and tower designs (e.g., solid towers rather than lattice towers) to further reduce avian mortality. Strobe lights would be placed on towers, which may promote avoidance by night-flying birds. In addition to the specific design measures that would reduce avian mortality, during the first year of commercial operation biologists would conduct periodic searches of the wind generation project for carcasses in accordance with the mortality monitoring procedures developed in consultation with USFWS. Searches would be conducted at times coinciding with annual migration, as well as during the nesting season (late spring and summer) and during late summer fledging

season to identify impacts to avian species. Local USFWS and NDGFD personnel would be notified if carcasses of migratory birds or federally-listed species or injured animals are found during these surveys. Notification would occur within 48-hours of incidents involving endangered species. A report summarizing the findings of the mortality monitoring surveys and observations made in accordance with FPL's Wildlife Procedures Manual (as noted in Chapter 2) would be prepared and submitted to USFWS.

During consultations, the USFWS expressed concerns regarding migratory birds and powerline interactions, as well as construction through wetlands and stream channels (Towner 2005). To address their concerns, the USFWS offered the following recommendation:

- Poles and other construction for overhead lines should be sited to avoid placement of fill in wetlands along the route.
- If construction is unavoidable in or near wetlands or streams, the following recommendations should be implemented:
    - Defer the timing of construction to late summer (after July 15) or fall so as not to disrupt waterfowl or other wildlife during the nesting season and to avoid high water conditions.
    - Replace unavoidable loss of wetland functions on an ecological value-for-value basis and trees or shrubs on a 2:1 basis.
    - Reseed disturbed grassland with a mixture of regionally native grass and forb species.
- New overhead powerlines should be constructed in accordance with the current guidelines for preventing raptor electrocutions as described in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* (APLIC 1996).
- If birds are found to be colliding with the transmission line, the USFWS recommended the lines be modified according to guidelines described in *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994* (APLIC 1994).
- Develop a voluntary Avian Protection Plan in accordance with the *Avian Protection Plan (APP) Guidelines* (APLIC and USFWS 2005) and the specific needs of the Burleigh County Wind Energy Center.

ENDANGERED, THREATENED, PROPOSED, CANDIDATE AND OTHER SENSITIVE SPECIES

The connection of the Proposed Action to Western's Garrison-Bismarck 230-kV Transmission Line is a Federal action. As a result, Western is the lead Federal agency responsible for ESA Section 7 compliance. The area of study for special status species was essentially the same as that for wildlife resources, with focus on the project area (**Figure 3-1).**

Existing Environment

Lists of protected species and species of concern are maintained by both Federal and state agencies. These listings are discussed separately below.

Federally Listed Species

The Endangered Species Act (ESA) requires protection of species Federally-listed as threatened or endangered and any habitat designated as essential to the maintenance or recovery of a listed species (designated critical habitat). One of the purposes of the ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved," (16 U.S.C. § 1531(b)). The designation of "critical habitat" serves several important express purposes and also informs other aspects of habitat protection under the ESA. The ESA allows for the protection of habitat in several ways, including: classifying impacts to critical habitat as a prohibited "take" of a particular species, the purchase of lands for critical habitat, cooperative programs with states, consultation on Federal actions or actions with a Federal nexus, and issuance of incidental take permits based, in part, on habitat protection.

Projects that may adversely affect listed or proposed species require formal consultation with USFWS. Significant changes to habitats of these species and projects that may result in a "take" require close scrutiny by the USFWS and may require special permitting or mitigation measures to lessen or mitigate effects.

A request was submitted on March 25, 2005, to the USFWS Ecological Services Office in Bismarck, North Dakota for information on endangered, threatened, proposed, and candidate that may be present in the project area. Of the Federally-listed species known to occur in North Dakota, the bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americanus*), interior least tern (*Sterna antillarum*), and piping plover (*Charandrius melodus*) are all known to occasionally or frequently occur near the

Project Area, primarily in the Missouri River corridor. Other species such as Gray wolf (*Canis lupus*) may also occasionally be present but are either infrequently observed or have only historic range in the Project Area. No Federally-listed species were observed during site surveys in 2005.

State Protected and Other Species of Conservation Concern

Through the Wildlife Conservation and Restoration Program (now known as State Wildlife Grants) legislation of 2001, NDGFD has identified 100 species in decline at the national, regional, or state level, or species whose population status is not well known, but thought to be in decline. These species are ranked by the NDGFD in three priority levels (Level I, Level II and Level III) based on factors such as: known status, funding available for conservation, and presence of breeding habitat in North Dakota (NDGFD 2004). A description of the priority levels is as follows:

- *Level I*- Species which have a high level of conservation priority because of declining status either in North Dakota or across their range; or a high rate of occurrence in North Dakota constituting the core of the species' breeding range, but are at-risk range wide, and non-State Wildlife Grant funding is not readily available to them.
- *Level II* - Species having a moderate level of conservation priority; or a high level of conservation priority, but a substantial amount of non-State Wildlife Grant funding is available to them.
- *Level III* - Species which have a moderate level of conservation priority, but are believed to be peripheral or do not breed in North Dakota.

A request was submitted on March 25, 2005, to the NDGFD office in Bismarck, North Dakota for information on state species that may be present in the project area. The sensitive species observed in the project area are shown in **Table 3-1**.

Environmental Consequences

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

TABLE 3-1
North Dakota Game and Fish - Birds of Conservation Priority

Common Name	Scientific Name	Priority Level
Northern harrier	*Circus cyaneus*	Level II
Swainson's hawk	*Buteo swainsoni*	Level I
Sharp-tailed grouse	*Tympanuchus phasianellus*	Level II
Willet	*Catoptrophorus semipalmatus*	Level I
Upland sandpiper	*Bartramia longicauda*	Level I
Marbled godwit	*Limosa fedoa*	Level I
Sprague's pipit	*Anthus spragueii*	Level I
Baird's sparrow	*Ammodramus bairdii*	Level I
Grasshopper sparrow	*Ammodramus savannarum*	Level I
Bobolink	*Dolichonyx oryzivorus*	Level II

The project area was surveyed for threatened, endangered, or candidate species on three occasions during the spring of 2005. The project area is not representative of bald eagle, whooping crane, interior least tern, and piping plover breeding habitat, and these species are not known to reside in the project area. In addition, these species were not observed during site surveys in the vicinity of the Proposed Action (Tetra Tech, Inc. 2005). It is possible that migrating whooping cranes could use the limited wetlands resources or uplands in the vicinity of the project area for feeding or roosting. While it is possible that these species could collide with turbines or overhead lines, such collisions are unlikely. Migrating bald eagles and whooping cranes tend to fly at altitudes well above the height of wind turbines. Also, because bald eagles and interior least terns tend to migrate along river corridors, they are less likely to migrate through the project area. However, elevations used when these birds move between feeding, resting, and loafing areas may result in collisions.

Suitable nesting habitat for piping plovers or interior least terns is non-existent within the project area, further reducing the likelihood of significant impacts to these species. Because piping plovers and interior least terns are not common inhabitants of the project area, they are not expected to experience direct or indirect impacts as a result of the Proposed Action.

The proposed action may result in the long-term loss of some foraging and loafing habitat of the whooping crane. Loss of winter feeding- and resting-cover is the main reason for the decline of the species (USFWS 1970). Some wetlands and native grasslands occur in the project area, and USFWS records indicate that whooping cranes have been observed in the vicinity of the project area (Terry Ellsworth pers. comm. 2005b). Due to the current size of the population of whooping cranes, direct and

indirect impacts to an individual whooping crane may constitute a significant impact. Marking of the 230-kV overhead transmission line was recommended by USFWS and incorporated into the proposed action to minimize potential for collisions. East-west oriented portions of the 34.5-kV overhead collection line would also be marked.

Bald eagles, Northern harrier, Swainson's hawk, sharp-tailed grouse, willet, upland sandpiper and marbled godwit may experience direct and indirect impacts to individuals. However, impacts are not likely to contribute to population decline.

Impacts to species of concern would be reduced by use of modern turbine and tower designs (e.g., solid towers rather than lattice towers), state-of-the art line marking techniques and development of an Avian Protection Plan for the Wind Energy Center. Environmental protection measures described in Chapter 2 of this document and the additional mitigation measures described in this Chapter (particularly in the previous "Wildlife" section) would further reduce impacts.

SOCIAL RESOURCES

SOCIOECONOMICS

The socioeconomic setting and potential impacts of the Proposed Action were evaluated on a regional basis with emphasis placed on Burleigh County. Regional and state-wide economic data are also discussed to allow comparison.

Existing Environment

The Proposed Action would be located in the northwestern portion of Burleigh County, near Wilton North Dakota, within a rural agricultural area. The following towns and communities in Burleigh County are located within 6 miles of the Proposed Action area (2000 census populations, as available):

- South Wilton (population 242);
- North Wilton (population 565);
- Regan (population 43);
- Wing (population 124);
- Wogansport; and
- Baldwin.

Services in these communities are limited. The largest near-by city, located approximately 20 miles south of the Proposed Action area, is Bismarck, North Dakota with a population of approximately 55,532 (U.S. Census Bureau 2003). This city offers a full range of services and is the capital of North Dakota. Bismarck has a variety of support services, including medical centers. The nearest hospital to the project area is St. Alexius Medical Center.

In 2003, the U.S. Census Bureau estimated Burleigh County had a population of 71,693, an increase of 3.3 percent from the 2000 census count of 69,416, and an increase of over 16 percent since the 1990 census (U.S. Census Bureau 2004). The county contains approximately 1,633 square miles, with a current population density of just over 42 people per square mile.

General demographics of the county, as measured in 2000, showed 95 percent of the population is composed of Caucasians, who are not of Hispanic or Latino origin (see Environmental Justice section below). At the time of the 2000 census, the median age of Burleigh County residents was 35.9, and 12 percent of the county population was 65 or older.

According to the 2000 census, the workforce in Burleigh County was involved in the following:

- Services (Health, Legal, Business, Others) – 35.9 percent;
- Retail Trade – 18.7 percent;
- Government – 17 percent;
- Finance – 6.9 percent;
- Transportation & Public Utilities – 5.4 percent;
- Construction – 5.4 percent; and
- Wholesale Trade – 3.9 percent.

Per capita income in 1999 was $20,436; median household income for the region for the same period was $41,309, which was about 16 percent more than the statewide median of $34,604 (U.S. Census Bureau 2000). Unemployment in Burleigh County was 3.4 percent in March 2005, compared with 4.2 percent statewide (Northwest Area Foundation 2005).

Environmental Consequences

Significant socioeconomic impacts would occur if the Proposed Action resulted in the degradation or commitment of existing goods and services to an extent that would limit the sustainability of existing communities.

Impacts from the Proposed Action on social and economic resources are expected to be short-term (less than 16 months). Measurable effects of the Proposed Action would likely follow the build-up and execution of the construction phase of the Proposed Action, which is expected to require up to 4 months to complete. The project would include two construction phases. The first phase would occur in 2005 and is expected to last approximately 4 months; the second phase would likely occur in 2006 and may occur over more than 4 months.

Construction crews would range from 80 to 120 personnel for the Proposed Action during each of the phases. Approximately 60 to 70 percent of the work force would be recruited locally. During peak construction, the estimated monthly payroll would range from $480,000 to $760,000.

Local businesses such as motels, restaurants, bars, gas stations, and grocery stores would likely experience some increase in revenue resulting from new employment of the non-resident portion (30 to 40 workers) of project construction crews. In particular, the consumption of goods, services, and temporary lodging in and near Bismarck, Wilton, and surrounding cities could be expected to minimally increase due to the presence of these non-native workers. Other local area businesses that may benefit through increased sales would likely include ready-mix concrete and gravel suppliers, hardware and general merchandise stores, welding and machine shops, packaging and postal services (Federal Express, United Parcel Service, U.S. Postal Service), and heavy equipment repair and maintenance services.

This relatively small increase in demand for local goods and services would not be minimal due to the small size of the non-local workforce and the short-term nature of the construction phase of the Proposed Action. For the same reasons, the effects to infrastructure such as schools, hospitals, housing, and utilities would also be minimal.

The North Dakota Department of Commerce determined that the Proposed Action would result in no detrimental changes to existing goods and services (NDDOC 2005).

ENVIRONMENTAL JUSTICE

The goal of environmental justice is to ensure the fair treatment and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of potentially adverse human health and environmental effects

of a Federal agency action, operation, or program. Meaningful involvement means that affected populations have the opportunity to participate in the decision process and their concerns are considered.

Executive Order (EO) 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) is intended to ensure that adverse human health and environmental effects of agency actions would not disproportionately impact minority and low-income populations, including Native American Indian Tribes. For purposes of this section, minority and low-income populations are defined as follows:

Minority Populations – People of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders.

Low-Income Populations – People living below the national poverty level. In 2000, the weighted-average poverty threshold for a family of four was $17,603, and $8,794 for an unrelated individual.

EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*) is intended to ensure adverse human health and environmental effects of agency actions would not disproportionately impact child populations.

Existing Environment

Estimates of two populations of concern (minority and low income) were developed to determine if environmental justice populations exist in Burleigh County (**Table 3-2**; U.S. Census Bureau 2005a,b).

The Standing Rock Sioux Reservation and the Fort Berthold Indian Reservation are approximately 50 miles from the project area. These two regions may represent the closest minority or low-income populations in the region.

TABLE 3-2
Minority and Low-Income Populations

Location	Total Population	Percent Minority	Percent Below Poverty
Burleigh County	69,416	5.4	7.8
State of North Dakota	642,200	8.3	11.9

The median family/household income for the region surrounding the project area is about 16 percent greater than the statewide average. Consequently, income does not constitute a condition that warrants focus under EO 12898.

Children and sensitive receptors exist near the Proposed Action area. However, the proximity of children and sensitive receptors to the Proposed Action does not constitute a condition that warrants focus under EO 13045.

Environmental Consequences

With regard to EO 12898, an impact would be considered significant if a low-income, minority, or subsistence population in the region of the Proposed Action was disproportionately affected by the Proposed Action.

Because of the distance of the Proposed Action from the Standing Rock and Fort Berthold Indian Reservations, no impacts to the economy, environment, or culture of the reservations are anticipated. In addition, Western's interactions with North Dakota Indian tribes are intended to address potentially adverse impacts to tribal interests outside the reservations. Therefore, discrimination toward or disproportionate impacts to low-income, minority, and subsistence populations resulting from the Proposed Action are not anticipated.

LAND USE

The evaluation for land use was focused on the project area (**Figure 3-1**), but includes some discussion that establishes the regional setting of the Proposed Action.

Existing Environment

The Proposed Action is located in the Ecklund and Ghylin Townships in Burleigh County, North Dakota. Local land use features in the project area include existing transmission lines, rural roads, rural residences, and agricultural properties. Agricultural properties comprise the majority of the project area and include lands used for a variety of agricultural purposes. Specific acreages of different agricultural land uses within the project area are not available because they change from year to year based on market trends and farm-specific operational requirements.

Hayland, cropland, and pasture are managed for the production of livestock forage and cereal crops within agricultural tracts. Management may include fertilization, weed and brush control by pesticide application, and management of fallow fields, tillage, and reseeding. Species composition often includes mixes of grasses and legumes, small grain hay, or monocultures of legumes such as alfalfa or clover. No prime or unique farmlands exist within the project area.

Environmental Consequences

Land-use impacts would pertain to physical and operational effects of the Proposed Action on existing and future land use. In the project area, these impacts are primarily related to agricultural practices. A significant impact would occur if: 1) the Proposed Action resulted in the uncompensated loss of crop production; or 2) the Proposed Action resulted in the foreclosure of future land uses.

Temporary and short-term impacts would occur from construction activities due to removal of existing agricultural land from crop or forage production. Permanent disturbance and loss of vegetation would result from installation of access roads, the substation, and turbine foundations and other permanent facilities.

Western, Burleigh County Wind, and Central Power would compensate landowners for land, both purchased and leased, that is required for the Proposed Action. However, construction of proposed facilities would affect existing agricultural uses locally and would be both short- and long-term, in duration.

Short-term effects would include a temporary loss of cropland during construction. Long-term impacts would include:

- Loss of cropland under and around structures;
- Modified farming operations near and around structures;
- Damage to farm equipment through collisions with proposed facilities; and,
- Modified aerial application of herbicides and fertilizers.

Impacts to existing land uses and agricultural practices have been reduced by siting structures in previously disturbed areas, or in areas where agricultural practices are already limited (along existing roads etc) or have been modified.

Less than 1 percent of the project area would be occupied by the proposed facilities and associated surface disturbances. In addition, land uses were among the considerations during siting of the wind generation project and ancillary facilities. As a result of these considerations and the implementation of environmental protection measures, the Proposed Action would not foreclose future land uses.

Environmental protection measures as described in Chapter 2 of this document would be implemented to minimize or avoid potential land use impacts from the Proposed Action. In addition, Western, Burleigh County Wind, and Basin would provide fair market value compensation to landowners for purchased and leased land.

VISUAL RESOURCES

The analysis of the visual study area was considered to be the general project area, including the wind energy center and those residential areas and roadways along the ROW of the proposed 230-kV transmission line connecting the wind energy center to the Garrison-Bismarck 230- kV Transmission Line (**Figure 2-1**).

Scenic quality is determined by evaluating the overall character and diversity of landform, vegetation, color, water, and cultural or manmade features in a landscape. Typically, more complex or diverse landscapes have higher scenic quality than those landscapes with less complex or diverse landscape features.

Existing Environment

The project area lies in a rural location with farming, livestock grazing, and related agricultural operations dominating land use. The area within the vicinity of the proposed Wind Energy Center consists of a rolling to moderately hilly landscape with prominent ridges trending in a northwesterly to southeasterly direction. The visual resources of the area are neither unique to the region nor entirely natural.

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

Key observation points (KOPs) are viewing locations that represent the location of the anticipated concentration of sensitive viewers (or the highest incidence of sensitive viewers) near the Proposed Action. KOPs for the Proposed Action include roadways such as: U.S. Highway 83 (located west of the project area), State Highway 36 (located north of the project area), 93rd Street (located east of the project area), 266th Avenue (located south of the project area), and occupied residences within the vicinity of the project area. There are approximately 15 occupied residences within the visual region of influence of the project area.

Currently, no distinctive landscape features exist in the project area that would require specific protection from visual impairment.

Environmental Consequences

Visual resources reflect aesthetic qualities of the landscape in terms of its public viewing value and sensitivity to change. Significant impacts to visual resources would occur if the Proposed Action interrupts a unique viewshed from a KOP.

Wind turbines, transmission lines and structures, and construction of access roads would result in changes to public views. The uppermost portion of the turbine blades would reach 360 feet above ground surface and would be visible for up to several miles, changing the visual character of the area from agricultural to quasi-industrial. These structures would be visible from all of the identified KOPs. Structures and facilities in the Wind Energy Center would be anywhere from 2,200 feet to 980 feet away from nearby highways. Some of the turbines would require strobe lights for aircraft safety, potentially changing the view from KOPs. Visual effects would decrease as the distance from the Wind Energy Center increases.

The transmission line would bisect the rural areas from the turbine array to the substation and continue west to the point of interconnection. The transmission line would be approximately 75 feet tall and would be visible from KOPs such as U.S. Highway 83, 266th Avenue, and many of the occupied residences. Two of the homes within the transmission corridor are within the 500-foot buffer and have signed consent agreements. The appearance of the transmission line would result in changes to the aesthetics of the landscape. Landowner concerns are a consideration in the ROW agreements negotiated along the route.

Impacts on visual resources within the project area were determined by considering the post-construction views from the KOPs, as discussed above. The project area does not contain any highly distinctive or important landscape features, registered cultural resources, or unique viewsheds. In addition, there are no visual quality standards in place within Burleigh County.

NOISE

Evaluation of noise was limited to potential receptors within the project area (**Figure 2-1**).

Existing Environment

The project area is located in a rural, predominantly agricultural area. As a result, sources of background noise to rural residents and occasional visitors to the area include: wind, agricultural activity, recreation (primarily hunting), vehicles traveling on U.S. Highway 83; State Highway 36, and low-traffic gravel roads such as 266th Avenue, 52nd Street, 93rd Street, and 132nd Street. Typical baseline noise levels in the project area likely range from approximately 38 average day-night sound levels measured in A-weighted decibels (dBA) to 48 dBA (USEPA 1978).

Potential noise receptors in the vicinity of proposed facilities include scattered rural residences, the closest of which is approximately 1,640 feet from one of the proposed turbine sites. **Figure 2-1** shows the locations of occupied residences in the project area.

Environmental Consequences

Significant impacts would occur if the Proposed Action results in noise levels in exceedence of national standards.

The National Safety Council (NSC) recommends no more than 85 dBA for 8 hours of exposure as the safe limit for farm operations. Industrial standards of the Occupational Safety and Health Administration (OSHA) regulations would apply to those involved in the construction, operation, and maintenance of the facilities. OSHA permissible noise exposures are shown in **Table 3-3.**

TABLE 3-3
OSHA Permissible Noise Standards

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

Noise generated by construction activities would occur intermittently over the construction period and would be generated by an increase in traffic on local roads, as well as heavy equipment operation. Available estimates from other wind farm construction projects indicate that the maximum noise levels from heavy equipment would be 85 to 88 dBA at a distance of 50 feet (Western 2003). Given that the distance to residences from any turbine is expected to be greater than 1,500 feet, noise levels are not expected to be exceeded and noise issues are not expected to be a concern at this project site.

Noise associated with the proposed transmission line construction is expected to be localized and short-term. All construction operations would occur during daylight hours. Two residences are located within 500 feet of the transmission line as shown in **Figure 2-1**. These landowners have been contacted and the proximity approved. Occupants of residences in proximity, but not within 500 feet of the line, would be contacted prior to construction to further reduce annoyances and other potential impacts from these operations.

Corona-generated audible noise from transmission lines is generally characterized as a crackling, hissing noise. The noise is most noticeable during wet-conductor conditions such as rain, snow, or fog. Transmission-line audible noise is measured and predicted in dBA. Some typical noise levels are light automobile traffic at 100 feet, 50 dBA; an operating air conditioning unit at 20 feet, 60 dBA; and freeway traffic or freight train at 50 feet, 70 dBA. This last level represents the point at which a contribution to hearing impairment begins. The average noise-level during wet weather at the edge of the ROW for the proposed transmission line is anticipated to be 46 dBA at 230 kV.

Noise estimates for wind generation projects of comparable size have been previously modeled. Model variables included turbine noise levels of 105 dBA, wind speed of 8 meters per second, no tonal noise, no background noise, and a noise threshold set to 50 dBA. Model results indicate a noise level range of between 45 and 50 dBA at 1,000 feet distance around the proposed wind generation project. Based on the expected typical baseline noise levels for the area (between 38 to 48 dBA) and given the wind speeds used for the calculations (8 meters per second), ambient noise levels would likely approach or mask entirely the noise generated from the turbines. Noise level standards set by NSC and OSHA would not be exceeded and the long-term increase in noise levels would be minimal.

TRANSPORTATION

The analysis area that would be used to determine impacts on transportation from the Proposed Action would be the area delineated by roadways adjacent to the project area. These roadways have been identified as: U.S. Highway 83 (located west of the project area), State Highway 36 (located north of the project area), 266th Avenue (located south of the project area), and 132nd Street (located east of the project area).

Existing Environment

The turbine array is located east of U.S. Highway 83 and south of State Highway 36. U.S. Highway 83 has a junction with Interstate 94 approximately 20 miles south of the project area. The road located south of the project area (266th Avenue) has a gravel surface and is a major collector that has a junction with U.S. Highway 83 to the west. Several roads lie either within the project area or east of the project area. These roads are 52nd Street, 93rd Street, and 132nd Street. All of these roads have gravel surfaces and receive a low volume of traffic. Motor vehicle traffic along the majority of roads within the vicinity of the project area is considered light, with low speed and low volume.

Environmental Consequences

Significant impacts would occur if: 1) the Proposed Action resulted in the permanent disruption of regional and local traffic; or 2) the Proposed Action results in the destruction of existing transportation infrastructure.

Construction of the Proposed Action would increase traffic on local roads to the site, possibly causing temporary impacts to local traffic flow while equipment is hauled to the site. There are several roads adjacent to the project area in which construction-related traffic would be concentrated. Construction-related vehicles would use 52nd Street, 93rd Street, and 66th Street, as they access the project area off of State Highway 36. In addition, a portion of 52nd Street would be improved for the purpose of transporting materials and equipment. These improvements would remain in place after construction is completed. A portion of the construction-related traffic would also occur on 266th and 279th Avenues. The construction company hired to build the project would obtain any necessary permits for transporting equipment. The North Dakota State Highway Patrol and NDDOT would be contacted regarding the transmission line crossing of U.S. Highway 83.

Construction activities associated with the Proposed Action would use the existing section line roads whenever possible. The Proposed Action would include approximately 7.2 miles of roads associated with the turbines and other support facilities installed during 2005; this estimate includes those section-line roads that would be upgraded. These roads would be constructed to assist with access and maintenance of the proposed facilities. Future roads associated with the expansion turbines would be constructed or upgraded to provide access to the expansion turbine locations. The precise location of these proposed future roads have not yet been determined.

Operation of the wind energy center is not expected to result in any significant traffic issues on the area highways or state roads because there would be only a minor increase in traffic (potentially two vehicles per day). In addition, the necessary permits would be obtained and safety protocols implemented.

SAFETY AND HEALTH ISSUES

Evaluation of safety and health issues was limited to the project area (**Figure 2-1**. This evaluation specifically focused on areas in the immediate vicinity of proposed wind turbines, access roads, transformers, buried and overhead transmission lines, and substations.

Existing Environment

The predominant activities that currently occur within the project area include agriculture and vehicular travel. The safety regulations for these activities are defined and enforced by Federal and state agencies.

Environmental Consequences

For the purpose of this analysis, a significant impact to public safety and health would occur if 1) the Proposed Action resulted in an increase in personal injuries; 2) the Proposed Action resulted in an increase in health risk to area residents; 3) the Proposed Action resulted in impacts to public health as a result of increased electric and magnetic fields; 4) the Proposed Action resulted in an increase in injuries or fatalities related to increased traffic during the construction and operation of the wind energy center; or 5) the Proposed Action resulted in a violation of Federal, state, or local regulations regarding handling, transport, or containment of hazardous materials.

Public Safety

Work plans and specifications would be prepared to address public safety during project construction. On such occasions that people not involved in facilities construction or operation are present, safety precautions such as fencing, limitations on access to high hazard areas, and provision of adult supervision would be implemented. Because of the distance and the construction/operation site control measures anticipated during these phases, it is anticipated that the project would not adversely influence the health of area residents.

Worker Safety

Project construction work plans and specifications would be prepared to address worker safety during Proposed Action construction. Preparation of these documents would include appropriate performance provisions for worker protection as is required under OSHA with emphasis on CFR 1926 – *Safety and Health Regulations for Construction*. Because development and preparation of these documents would be prepared as part of FPL Energy's contractor bid specifications, there would be no increase in injuries to workers. In addition, all workers would adhere to the safety standards and guidelines set forth by all parties involved in the Proposed Action.

Electric and Magnetic Fields

The proposed transmission line for the project area is a 230-kV line. At maximum thermal capacity of the conductor, approximately 900 amperes would flow in each of three phases. Voltage and current are required to transmit electrical power over the transmission line. A phenomenon called electromagnetic field (EMF) results from electrically charged particles which may cause effects some distance away from the line. Voltage (measured in volts or kilovolts) is the source of the electric field. Current (measured in amperes) is the source of a magnetic field. Fields drop rapidly as the distance increases from the source. The electrical effects of the 230-kV transmission line would be characterized as "corona effects" and "field effects." Safety concerns directly relating to EMF have also been identified.

Corona Effects

Effects of corona are audible noise, visible light, radio and television interference, and photochemical oxidants. Corona effect can be described as the situation when the voltage is at high levels and the electrons are attracted to ground (at lower potential) with sufficient energy to ionize air. It is this breakdown that produces the corona. Noticeable side effects of corona are:

Audible Noise – Corona generated audible noise is generally characterized as a crackling/hissing noise, most noticeable during wet-weather conditions. There are no design-specific regulations to limit audible noise from transmission lines. Audible noise generated from the proposed 230-kV line would be indistinguishable from background noise.

Visible Light – Corona is visible as a bluish glow under conditions of darkness, and probably only with the aid of telescopic devices. Light would be difficult to detect at the operating voltage of 230 kV.

Radio and Television Interference – Corona-generated interference is most likely to affect amplitude modulation (AM) broadcast band reception at transmission line voltages of 345 kV or more. Frequency modulation (FM) broadcast band reception is rarely affected. The proposed transmission line would be constructed according to standards that minimize sources of corona, such as surface irregularities and sharp edges on suspension hardware.

Photochemical Oxidants – Corona would ionize the surrounding air and generate ozone and nitrogen oxides. The low levels of oxidants produced would not be measurable either near the line or at ground level.

Field Effects

Field effects include induced current and voltage in conducting objects near the line, spark discharge shocks, steady-state current shocks, field perception at ground level, and magnetic field.

Current and Voltage – Voltage induction and the creation of currents in long conducting objects, such as fences and pipelines, would be possible near the proposed transmission lines. Grounding practices and the availability of mitigation measures would minimize the magnetic induction effects of the line. Non-electric fences, such as those made of barbed wire directly attached to steel posts, would be adequately grounded and would not collect an electric charge. It is recommended that other types of wire fences be constructed using at least one steel post every 150 to 200 feet to ground the fence.

Spark-Discharge Shocks – If the induced voltage were sufficiently high on an ungrounded object, a spark discharge shock would occur as contact is made with the ground. At the operating voltage of 230 kV and with standard design practices, shock discharge and nuisance shocks would be unlikely.

Steady-State Current Shocks – Steady-state currents are those that flow after a person has contacted an ungrounded object, providing a path for the induced current to flow to ground. Design requirements that

reduce or eliminate induced current and voltages would help ensure steady-state current shocks would not occur.

Field Perception – When the electric field under a transmission line is sufficiently high, persons standing under or near the line may perceive hair rising on an upraised hand. At the operating voltage of 230 kV, any of electric fields from the proposed line should not be perceived.

Safety Concerns Related to Electric and Magnetic Field (EMF)

Safety concerns have been identified with regard to field effects. These effects are generally related to the EMF surrounding transmission lines. It is not known if any EMF levels are unsafe. Some non-governmental organizations have set advisory limits as a precautionary measure, based on the knowledge that high field levels (more than 1000 times the EMF found in typical environments) may induce currents in cells or nerve stimulation. The International Commission on Non-Ionizing Radiation Protection has established a continuous, magnetic field exposure limit of 0.833 Gauss(G), or 833 milliGauss (mG), and a continuous electric field exposure limit of 4.2 kilovolts per meter (kV/m) for members of the general public. The American Council of Governmental Industrial Hygienists publishes Threshold Limit Values (TLVs) for various physical agents. The TLV for occupational exposure to 60 Hz magnetic fields has been set as 10 G (10,000 mG) and 25 kV/m for electric fields.

The earth's fields are static, or 0 Hz frequency. The earth's magnetic field is about 500 mG. The earth's electric field is about 100 V/m, but thunderstorms can temporarily increase the field in a given location to several thousand V/m. In the home, in addition to the earth's natural fields, there are power frequency fields (60Hz). All electric appliances produce electric and magnetic fields having a frequency of 60 Hz (**Table 3-4**). The fields are greatest closest to the surface of the cord and appliance, and drop rapidly in just a short distance. The average household background 60 Hz magnetic field is about 1 to 2 mG. The average background 60 Hz electric field is 1 to 20 V/m.

All overhead lines produce fields. The fields are usually the highest directly under the lines and fall rapidly with distance to the sides of the line. Actual field strengths would vary depending on the height of the conductors from the point of measurement. Electric fields from power lines are relatively stable because voltage does not change. Magnetic fields fluctuate greatly as current changes in response to changing load. The magnetic fields in **Table 3-5** were calculated for a population of 321 power lines using 1990 mean loads.

TABLE 3-4
Typical 60 Hz Magnetic Field Levels From Common Home Appliances
(where available)

Appliance	Magnetic Field 6 Inches from Appliance (mG)	Magnetic Field 2 Feet Away (mG)
Electric Shaver	100	-
Vacuum Cleaner	300	10
Electric Oven	9	-
Dishwasher	20	4
Microwave Oven	200	10
Hair Dryer	300	-
Computers	14	2
Fluorescent Lights	40	2
Facsimile Machines	6	-
Copy Machines	90	7
Garbage Disposals	80	2

TABLE 3-5
Typical 60 Hz Electric and Magnetic Field Levels From Overhead Powerlines

Voltage of Line	Centerline	Approx. Edge of Right of Way	100 feet	200 feet	300 feet
115 kV					
Electric Field kV/m	1.0	0.5	0.07	0.01	0.003
Magnetic Field mG	30	6.5	1.7	0.4	0.2
230 kV					
Electric Field kV/m	2.0	1.5	0.3	0.05	0.01
Magnetic Field mG	57.5	19.5	7.1	1.8	0.8
500 kV					
Electric Field kV/m	7.0	3.0	1.0	0.3	0.1
Magnetic Field mG	86.7	29.4	12.6	3.2	1.4

Magnetic fields at the edge of ROW (25 feet from centerline) at maximum line capacity are calculated to be 7.4 mG. At a distance of 50 feet from the centerline, the maximum fields would be less than 2 mG. It is unlikely that exposures to the electric and magnetic fields from the proposed line would have adverse effects on biological systems, based on the low levels of magnetic fields from the proposed line and the fact that the proposed line would not be located near a residential area. Electric fields would be less than one kV/m and no significant adverse impacts are anticipated.

In the June, 2005 British Medical Journal, Draper, Vincent, Kroll and Swanson's paper *Childhood cancer in relation to distance from high voltage power lines in England and Wales: a case-control study*

reported on the risk of childhood leukemia in relationship to their home address when born. Compared with those who lived greater than 600 meters from a transmission line at birth, children who lived within 200 meters had a relative risk of 1.69. Those between 200 and 600 meters had a relative risk of 1.23. The researchers reported "there is no accepted biological mechanism to explain the epidemiological results; indeed the relation may be due to chance or confounding."

No Federal regulations have established environmental limits on the strengths of fields from power lines. There are no established limits for fields in North Dakota. The state of Florida limits the magnetic field to less than 150 mG at the edge of the right-of-way for 69 to 230 kV transmission lines. The state of New York limits the magnetic field to less than 200 mG at the edge of the right-of-way. The states of Florida, Minnesota, Montana, New York, and Oregon set limits of between 7 and 11 kV/m electric field strength at the edge of the right-of-way.

Underground Collection System

Placement and care of underground power transmission lines comes with inherent risks. Lines may be cut or contacted by others digging in or across the proposed utility corridors. Underground utility locations would be identified with appropriate signage in the project area. Above ground utilities may also require signage with maximum vehicle height designations. The National Electric Safety Code (NESC) publishes recommended safety requirements for transmission systems. Recommended clearances within the NESC consider a relative vehicle height of 14 feet. Proper planning and adherence to safety regulations would ensure that no significant adverse impacts to safety as a result of the collection system occur.

Safety Issues Related to Increased Traffic during Construction

Motor vehicle traffic near the project area would temporarily increase during the construction phase as contractors working in the area establish the new power generation system. Traffic management and control of the local roadways would be considered in the forward planning and implementation of the Proposed Action. With these measures, the potential for a traffic fatality is low; consequently, an increase in risk to local residents or an increase in injuries and fatalities related to traffic is not anticipated.

In summary, with consideration during siting of the Proposed Action (avoidance), and implementation of proper mitigations as required by Western's construction standards, OSHA, and other regulatory agencies, there would be no significant impacts to human safety and health resulting from the Proposed Action.

CULTURAL RESOURCES

Cultural resources include archaeological and historical sites, buildings, structures, and objects of historic, scientific, social value, or places of spiritual and cultural significance. The primary legislation that mandates Federal management and protection of cultural resources is the National Historic Preservation Act (NHPA) of 1966 (as amended in 1976, 1980, and 1992), specifically Section 106 of the act. For the purpose of 106 compliance, properties are considered significant if they meet the criteria for listing on the National Register of Historic Places (NRHP) (36 CFR part 60). Western is responsible for Section 106 consultation with the NDSHPO and interested public and tribes.

Cultural Background

The cultural history, from an archaeological perspective, of the region surrounding the project area extends back approximately 12,000 years. A prehistoric and protohistoric summary of the area follows:

Paleo-Indian Tradition (ca. 9500 – 5500 BC) – This is the earliest convincingly documented period of human occupation in North America. Known Paleo-Indian materials in the region consist primarily of surface finds of dateable artifacts such as projectile points (State Historical Society of North Dakota 1990).

Plains Archaic Tradition (ca. 550 BC – AD 1700) – This tradition is marked by a shift in overall subsistence strategies, increased diversity, and regionalization of projectile point styles. Cultural materials and sites from this period are quite common within the James River Study Unit (State Historical Society of North Dakota 1990).

Plains Village Tradition (ca. AD 1000 – 1780) – This tradition is marked by a subsistence strategy using both hunting and gathering and small-scale, primarily corn-based agriculture.

Equestrian Nomadic Tradition (ca. post-1720) – This tradition is marked by the introduction of horses and goods of European manufacture to indigenous cultural groups. Commonly termed the "protohistoric" period, this is the period when native peoples began to come under the influence of European culture without necessarily coming into direct contact with Europeans.

Like most other places in the interior of North America, the earliest historic activity (marked by direct contact between Native Americans and Europeans) in North Dakota was connected with the fur trade. A partial list of Native American tribes known or suspected to have inhabited the general area in

protohistoric or historic times would include: the Nakota (Yankton and Yanktonai, or Middle Sioux), Lakota (Teton or Western Sioux), Dakota (Santee, Woodland, or Eastern Sioux), Cheyenne, Hidatsa, Assiniboine, Mandan, Arikara, Plains Ojibwa, and Crow (State Historical Society of North Dakota 1990; Wilkins and Wilkins 1977; Lowie 1963).

Existing Environment

Metcalf Archaeological Consultants were contracted to conduct a Class III cultural resource inventory for the Proposed Action (Stine, 2005). The investigation involved an inventory of all proposed facilities associated with the initial phase of the Proposed Action, including the initial 33 turbines and associated collection lines, the collection substation, the new 230-kV transmission line, the temporary tap, the switching station for Option C and portions of options A and B, and access roads to serve all these facilities.

The expansion turbines and associated access roads and collection lines, as well as remaining portions of the switching station options A and B, have not yet been inventoried. Class III surveys and consultation would be completed prior to conducting any ground-disturbing activities for these additional areas.

The results of the inventory for the initial phase noted above revealed three prehistoric sites, three isolated finds and one historic site within the project area. The prehistoric sites and isolated finds were sparse lithic scatters. The prehistoric sites have not been formally evaluated for NRHP eligibility; however, given their sparse nature, none of the sites are likely eligible (Stine 2005).

The only historic site within the survey area is an active railroad (32BL541) that was formerly part of the Soo Line built in the early 1900s. The site was recorded by L. Hafermehl in 2004 and is part of Dakota, Missouri Valley and Western Railroad, Inc. The site was recommended as not eligible for the NRHP.

Environmental Consequences

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

Upon completion of the cultural resource inventory for the initial phase, it was determined that two of the proposed turbine sites may potentially disturb two of the prehistoric lithic scatter sites. As a result of these findings, these proposed turbine sites have been relocated to avoid these sites. Consultation with NDSHPO and interested tribes supported this concept. Additional Class III cultural inventories and

consultation would be completed prior to the second phase of the Proposed Action. Turbines, collection lines, roads, and the permanent substation location would be designed and sited to avoid cultural resources.

As discussed in Chapter 2, gravel would be used for upgrading and developing roads in the project area. The gravel used for the Proposed Action would come from gravel pits that have already been investigated and cleared by the NDSHPO. If a gravel pit were to be used that has not been cleared by NDSHPO, that site would be inventoried and NDSHPO and interested public and tribes would be consulted prior to its use. The same would be true of any soils required for fill at any facility location associated with the Proposed Action.

Additional mitigation, if required, would be developed in consultation with the NDSHPO and other interested parties and may include treatment of all known sites, those discovered during pre-construction surveys and those discovered during construction or maintenance activities. If historic or prehistoric materials are discovered during monitoring of earth-disturbing construction activities, construction would be halted and Western would be notified in order to initiate procedures outlined in 36 CFR Part 800. These procedures would include evaluating the find for eligibility and determining appropriate treatment with the NDSHPO and the North Dakota Intertribal Reinternment Committee (NDIRC).

NATIVE AMERICAN RELIGIOUS CONCERNS

In addition to NEPA, NHPA, and DOE American Indian and Alaska Native tribal consultation policy (DOE 2000), other regulations that pertain to consideration of Native American religious concerns include the American Indian Religious Freedom Act (AIRFA) and the Native American Graves Protection and Repatriation Act (NAGPRA). AIRFA provides that agencies consider the effects of their actions on Native American religious practices. NAGPRA provides that if native human remains, funerary objects, sacred objects, and objects of cultural patrimony are found on Federal land, the Federal agency (Western) is responsible for disposition of these remains and objects. This can include tribal consultation to identify potential affiliation and repatriation needs. NHPA, AIRFA, and NAGPRA all mandate consultation with affected native groups.

Existing Environment

Research of cultural resources (discussed in greater detail in the Cultural Resources section) indicates that Native Americans who inhabited the region throughout prehistoric and historic times typified the culture of the North American Plains Indians. Subsistence was focused on hunting, gathering, and small-scale agriculture. However, Native American hunting parties likely frequented uplands including the site of the proposed Burleigh County Wind Energy Center.

Metis Cultural Resource Consultants conducted a survey of traditional cultural properties within the immediate vicinity of both phases of the Proposed Action (Ferris and Nadeau 2005). This survey was conducted to identify the existence of traditional cultural properties within the project area that would be directly impacted by project implementation and in locations within the area of potential effect (APE) that may be secondarily affected (i.e. viewshed, changing land use, etc.). The results of this survey identified several stone circles and rock cairns, including potential burial sites. The report recommended avoidance of these sites.

In addition, consultation has been initiated with the NDIRC, which represents collective tribal interests in North Dakota on issues related to sacred sites (State Historical Society of North Dakota 1990). This consultation would be ongoing throughout planning and construction of the Proposed Action, including addressing comments to the EA and meeting with tribes.

Environmental Consequences

A significant impact would occur if the Proposed Action caused an unmitigated, adverse effect to a traditional cultural property (TCP) or a burial site. Western entered into a Memorandum of Agreement (MOA) with the NDIRC during 1996 to ensure that provisions of NAGPRA are addressed on lands owned and/or managed by Western. To mitigate the potential for significant effects from activities associated with the Proposed Action, Western would address any concerns expressed by the NDIRC during the course of Proposed Action planning and construction in accordance with the terms of the MOA.

Siting and construction of the Proposed Action would be subject to the following North Dakota laws: *Protection of Human Burial Sites, Human Remains and Burial Goods* (ND Century Code §23-06-27) and *Protection of Prehistoric Sites and Deposits* (ND Century Code §55-03, *et seq*.). As a result, Western would notify the appropriate individuals, agencies, and authorities in accordance with these laws and the

NDIRC MOA in the event that important cultural or historic resources are discovered during inventories or construction associated with the Proposed Action.

TCPs were identified within the survey area. Project planning, however, has and would continue to consider and avoid these sites. If burials or cultural sites with Native American religious values are identified during construction of the Proposed Action, work would halt within 200 feet of the site until Native Americans are notified and consulted about mitigation measures.

Consultations between Western and interested tribes would continue and recommendations resulting from these consultations would be considered and implemented to the extent practicable. Burleigh County Wind, in cooperation with Native American representatives and agreements with landowners, would also implement additional measures and agreements to protect these resources.

NO ACTION

Under the no action alternative, no aspect of the project would be built. Western would continue to operate and maintain the Garrison to Bismarck Transmission Line and associated facilities.

As a result, environmental impacts from construction and maintenance associated with the Proposed Action would not occur. Most environmental conditions, as described in the Affected Environment, would be expected to persist in their existing dynamic state. The need for renewable energy would not be satisfied in part by construction of the project.

CUMULATIVE EFFECTS

Cumulative effects would result from impacts of the proposed Burleigh County Wind Energy Center when added to other past, present, and reasonably foreseeable future actions occurring in the region. Significant cumulative impacts would result if impacts from the Proposed Action, when added to other actions in the region, resulted in one or more significant impacts as defined for each resource area analyzed in this chapter.

PAST AND PRESENT

Agriculture practices; vehicle travel along township, county, state, and Federal roadways; railroad operation and use; and operation of existing electrical transmission lines are the primary activities that have occurred and are occurring in the project area and generally in the region. The cumulative effects of the proposed Burleigh County Wind Energy Center would be to wildlife when added to these past and present activities.

Impacts to wildlife caused by implementing the Proposed Action would be the direct mortality of avian species, including waterfowl, upland birds, and raptors, from collisions with wind turbines or transmission lines. This anticipated increase in avian mortality would be additive to existing causes of impacts to wildlife from the aforementioned activities (i.e., human disturbance, vehicle collisions, and transmission line collisions and electrocutions), as well as natural predation, disease, and hunting. Although few data exist regarding wind generation project-caused wildlife mortality, Western expects that cumulative effects of the proposed Burleigh County Wind Energy Center and existing conditions would have little effect on wildlife populations in the area. Therefore, no significant cumulative impacts for wildlife would occur.

REASONABLY FORSEEABLE FUTURE ACTION

No reasonably foreseeable development scenario has been identified at this time. The potential for additional wind energy development does remain in the area; however, there are no known projects planned by Burleigh County Wind or others in the immediate area.

CHAPTER 4
AGENCIES CONTACTED/CONSULTED

FEDERAL AGENCIES

Federal Aviation Administration

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

U.S. Department of Agriculture – Farm Service Agency

U.S. Department of Agriculture – Natural Resources Conservation Service

U.S. Geological Survey

Occupational Safety and Health Administration

STATE AND LOCAL AGENCIES

Burleigh County Board of County Commissioners

Burleigh County, Ecklund, and Ghylin Township Boards

North Dakota Aeronautics Commission

North Dakota Department of Health, Division of Air Quality

North Dakota Department of Health, Division of Water Quality

North Dakota Department of Transportation

North Dakota Indian Affairs Commission

North Dakota Parks and Recreation Department

North Dakota Public Service Commission

North Dakota State Historic Preservation Office

North Dakota State Land Department

North Dakota State Water Commission

NATIVE AMERICAN TRIBES AND RELATED BODIES

Northern Cheyenne Tribe

North Dakota Intertribal Reinternment Committee

Sisseton-Wahpeton Oyate

Spirit Lake Nation

Standing Rock Sioux Tribe

Three Affiliated Tribes

Turtle Mountain Band of Chippewa Indians

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