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

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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.

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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.

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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 Page Intentionally Left Blank - Insert Figure 3-2**

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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.