Document Type: EA-Administrative Record
Index Field: EA
Project Name: Ashley Wind Energy Project
Project Number: 8120-08-U

ENVIRONMENTAL ASSESSMENT

ASHLEY WIND ENERGY PROJECT

McIntosh County, North Dakota

PREPARED FOR:
TENNESSEE VALLEY AUTHORITY

SUBMITTED BY:
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OCTOBER 2010

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AADT	Average Annual Daily Traffic
AAQS	Ambient Air Quality Standards
ABPP	Avian and Bat Protection Plan
Act	North Dakota Energy Conversion and Transmission Facility Siting Act
AMP	Adaptive Management Plan
APE	area of potential effect
AQRV	air quality related values
ARPA	Archaeological Resources Protection Act
ASTM	American Society for Testing and Materials
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BMPs	best management practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
Certificate or CSC	Certificate of Site Compatibility
CFR	Code of Federal Regulations
CPV or Developer	CPV Ashley Renewable Energy Company, LLC
CPVH	Competitive Power Ventures, Holdings, LLC
CPV REC	CPV Renewable Energy Company, LLC
CRP	Conservation Reserve Program
CSC	Certificate of Site Compatibility
CWA	Clean Water Act
dBA	A-weighted decibel
DOE	Department of Energy
EA	environmental assessment
Easement Agreement	Wind Energy Project Easement Agreement
EDR	Environmental Data Resources, Inc.
EMF	electromagnetic fields
EIS	environmental impact statement
EPC	engineering, procurement, and construction
ESA	Endangered Species Act or Environmental Site Assessment
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FERC	Federal Energy Regulatory Commission
FEMA	Federal Emergency Management Agency
FICAN	Federal Interagency Committee on Noise
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
GE	General Electric
GHG	Green house gas
GIS	geographic information system
gpm	gallons per minute

HUD	U.S. Department of Housing and Urban Development
Hz	Hertz
IEC	International Electrotechnical Commission
ISO	Organization for International Standardization
KEM	KEM Electric Cooperative, Inc.
kV	kilovolt
Lead Agency or TVA	Tennessee Valley Authority
LMR	Land Mobile Radio
m	meter
m^2	square meters
m/s	meters per second
MBTA	Migratory Bird Treaty Act
MDU	Montana-Dakota Utilities Company
met	meteorological
mi	mile
mi^2	square mile
min	minute
MISO	Midwest Independent Transmission System Operator
MW	megawatt
MWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDCRS	North Dakota Cultural Resource Survey
NDDOH	North Dakota Department of Health
NDDOT	North Dakota Department of Transportation
NDIC	North Dakota Industrial Commission
NDGFD	North Dakota Game and Fish Department
NDGS	North Dakota Geological Survey
NDNHI	North Dakota Natural Heritage Inventory
NDPDES	North Dakota Pollutant Discharge Elimination System
NDPRD	North Dakota Parks and Recreation Department
NDSWC	North Dakota State Water Commission
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NLCD	National Land Cover Dataset
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
NWP	Nationwide Permit

OHWM	ordinary high water mark
O&M	operation and maintenance
Operator	Entity hired to operate the constructed Project
PLOTS	Private Lands Open to Sportsmen
PPA	power purchase agreement
Project	Ashley Wind Energy Project
PSC	North Dakota Public Service Commission
PSD	Prevention of Significant Deterioration
PTC	production tax credit
REC	recognized environmental condition
RECER	Renewable Energy and/or Clean Energy Resources
REPP	Renewable Energy Policy Project
RFP	Request for Proposals
road agreement	Road Use and Maintenance Agreement
ROD	Record of Decision
rpm	rotations per minute
RPS	renewable portfolio standards
RPW	relatively permanent water
RSA	rotor swept area
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
Siemens	Siemens Energy, Inc.
SODAR	Sonic Detection And Ranging
SPCC Plan	Spill Prevention Control and Countermeasure Plan
Survey	Class I cultural resources survey
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Property
Tetra Tech	Tetra Tech EC, Inc.
TNW	traditional navigable water
TVA or Lead Agency	Tennessee Valley Authority
UND	University of North Dakota
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCFZ	Worst Case Fresnel Zone
WMA	Wildlife Management Area
WPA	Waterfowl Production Area
WRP	Wetland Reserve Program
WRRS	Wildlife Response and Reporting System

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CHAPTER 1

1.0 PURPOSE OF AND NEED FOR ACTION

Pursuant to its 2007 Strategic Plan and 2008 Environmental Policy, the Tennessee Valley Authority's (TVA's) objectives include increasing the amount of renewable energy resources in its generation portfolio. Supporting this effort, the TVA Board recently authorized the purchase of as much as 2,000 megawatts (MW) of renewable and clean energy by 2011. Increasing the amount of renewable energy resources would also assist TVA in meeting potential renewable portfolio standards (RPS), utilizing more renewable electricity in its own facilities, broadening its generation mix, improving grid and power supply reliability and meeting future consumer demand for electricity through low carbon-emitting facilities.

To support these efforts, in December of 2008, TVA sought proposals from qualified and eligible proposers to supply capacity and/or energy from Renewable Energy and/or Clean Energy Resources (RECER) beginning as early as June 1, 2009 and as late as 2012. TVA entertained term proposals for such power supply of 1 to 20 years in duration.

Many of the proposals received were for wind energy sources of generation. From numerous proposals, CPV Ashley Renewable Energy Company LLC's (CPV or the Developer) Ashley Wind Energy Project (the Project) was one of those conditionally selected by TVA to satisfy the RECER need.

The purpose of the Action subject to this environmental review is to:

1. Acquire up to 200 MW of economically-viable renewable wind energy generated from the Project in support of meeting TVA's renewable energy goals.

2. Help meet the demand for energy on the TVA power system.

The Project as proposed would meet both of these objectives.

1.1. Need For Power

The Tennessee Valley Authority (TVA) is an instrumenatlity of the United States, established by an act of Congress in 1933. As part of its mission TVA operates the largest public power system in the United States, producing about 4 percent of all electricity in the nation. The agency serves an 80,000 square mile region encompassing nearly all or portions of seven states and a population of about 9 million people. Dependable capacity on the TVA power system is about 37,000 Megawatts (MW), which in fiscal year 2009 generated about 145 billion kilowatt-hours of electricity. TVA generates most of this power from a portfolio of nuclear, coal-fired, combined and simple-cycle gas-fired, hydroelectric and pumped storage facilities, as well as renewable wind, solar and methane-fueled power sources. Like other utility systems, TVA has power interchange agreements with utilities surrounding the Tennessee Valley region and purchases and sells power on an economic basis almost daily.

Electricity is a just-in-time commodity. The resources needed to produce the amount of electricity demanded from a system must be available when the demand is made. If the demand cannot be met or reduced through managed demand response programs, forced

reductions and curtailments in service (brownouts or blackouts) result. From 1990 to 2008, demand for electricity in the TVA power service area grew at an average annual rate of 2.3 percent. The 2008-2009 economic recession has slowed load growth in the short term and adds uncertainty to the forecast of power needs. However, economic recovery is expected and future power needs are expected to grow. As most recently analyzed (September 2010) for the baseline scenario in TVA's draft Environmental Impact Statement, "Integrated Resource Plan - TVA's Environmental and Energy Future," (available on TVA's external website at tva.gov), peak load and net system energy requirements grow at average annual rates of 1.3 percent and 1.0 percent, respectively. This future demand is projected to exceed the capabilities of currently available and future planned generating resources (as well as energy efficiency and demand reduction efforts), producing both a capacity and energy gap.

1.2. The Decision

Contingent upon environmental acceptability as determined through review under the National Environmental Policy Act (NEPA), as well as the availability of firm transmission capacity, the TVA would purchase up to 200 MW of renewable power under a 20-year power purchase agreement (PPA) with CPV. CPV is a direct subsidiary of CPV Renewable Energy Company, LLC (CPV REC). In order to supply this renewable energy, CPV is proposing to construct and operate the Project as a wind-powered generating facility in McIntosh County, North Dakota. The Project Area is defined as the approximate 17,400 acres of private land under Easement Agreement with CPV for the Project as shown on Figure 1-1. The Project would interconnect to the Midwest Independent Transmission System Operator (MISO) electric grid via an existing 230-kilovolt (kV) Montana-Dakota Utilities Company (MDU) transmission line located in the Project Area.

Under the PPA, TVA's obligation to purchase renewable power is contingent upon the satisfactory conclusion of an environmental review and TVA's determination that the Action will be "Environmentally Acceptable." In determining whether the project is Environmentally Acceptable, TVA must take into account "applicable federal laws and regulations" and conclude that the "location, operation and maintenance of the Project and any associated facilities will not result in unacceptable impacts inconsistent with the purposes provisions and requirements of all applicable federal, state and local environmental laws and regulations."

1.3. Other Pertinent Environmental Reviews or Documentation

This environmental assessment (EA) tiers from TVA's Integrated Resource Plan (IRP) final environmental impact statement (EIS), termed *Energy Vision 2020* (TVA 1995).

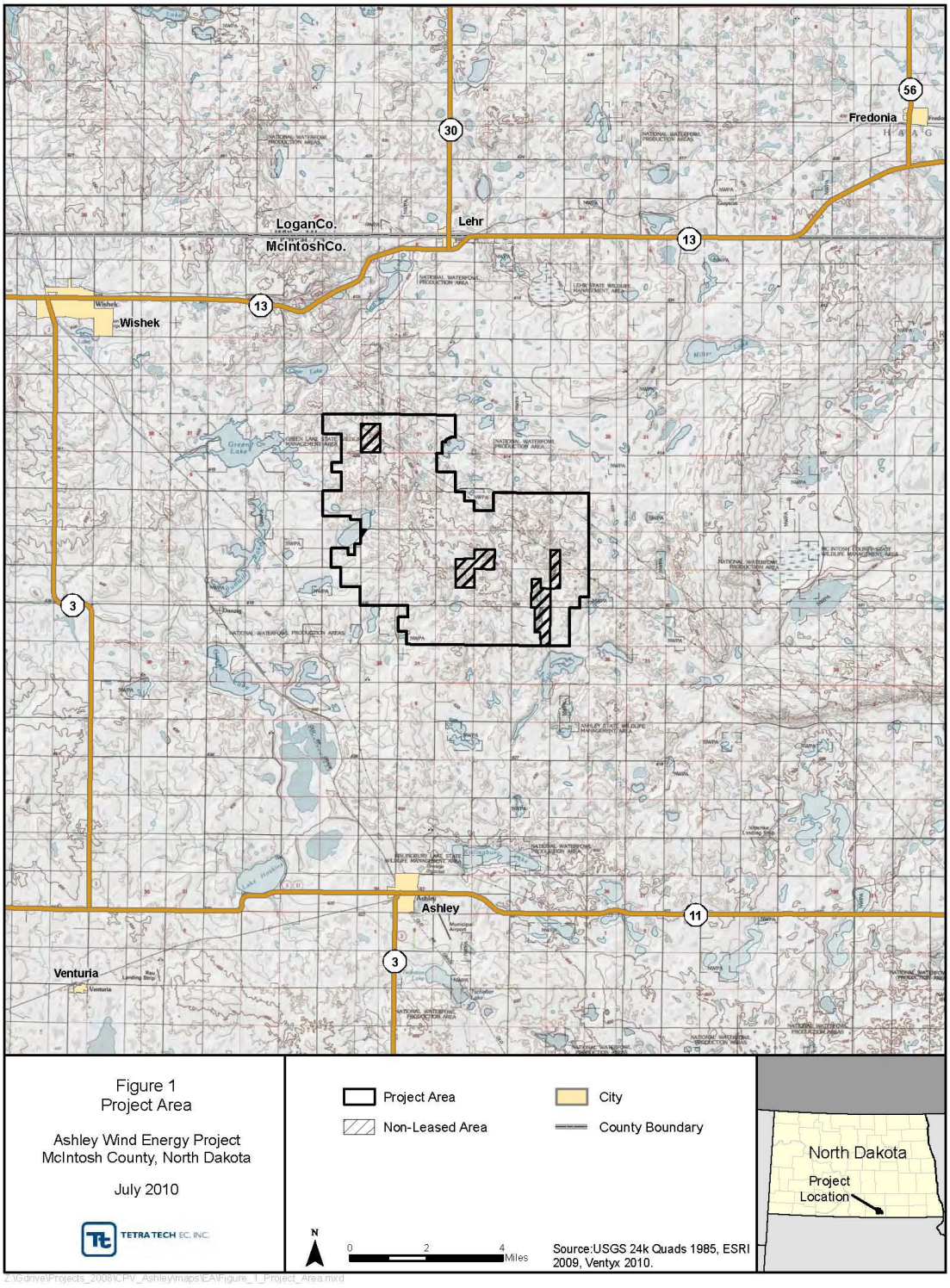

Figure 1-1. Project Area

The construction and operation of the proposed Project is contingent upon receipt of permits or approvals from several North Dakota state agencies. The state agencies and permits or reviews applicable to the Project include:

- North Dakota Public Service Commission (PSC) – Certificate of Site Compatibility (CSC)

- North Dakota Department of Health (NDDOH), Division of Water Quality
  - North Dakota Pollutant Discharge Elimination System (NDPDES) General Permit and Storm Water Pollution Prevention Plan (SWPPP)
  - Section 401 Water Quality Certification

- North Dakota Department of Transportation (NDDOT)
  - Driveway Permit
  - Overweight/Oversized Permit
  - Utility Occupancy Permit

The Project also will apply to Federal Energy Regulatory Commission (FERC) for Exempt Wholesale Generator status and Market- Based Rate Authority.

The Developer has evaluated the proposed Project Area for environmental concerns through a number of desktop and field studies. The results and findings of these studies provided information for the design of the proposed Project layout to reduce or avoid potential environmental impacts. In addition, TVA has reviewed these studies in order to develop the scope of this EA, as discussed in Chapter 1.3. The environmental studies completed by the Developer to date include:

- Native Prairie Survey (report dated May 2010)
- Bat Likelihood of Occurrence Report (report dated May 2010)
- Whooping Crane Likelihood of Occurrence Report (report dated May 2010)
- Fall 2009 Avian Survey (report dated March 2010)
- Class I Cultural Resources Investigation (report dated March 2010)
- Comsearch Telecommunications Studies (report dated November 2008)
- Aviation Systems, Inc. Feasibility Evaluation (report dated September 2009)
- 2010 Spring Avian Survey (report dated August 2010)
- Turbine Model Comparison for the Fall 2009 and Spring 2010 Avian Surveys (report dated September 2010)
- Acoustic Analysis (report dated August 2010)
- Shadow Flicker Impact Analysis (report dated August 2010)
- Wetlands Delineation (report dated September 2010)
- Class III Archaeological Investigation (report dated September 2010)
- Class II Architectural Reconnaissance Survey (report dated September 2010)

Pertinent findings from these studies are incorporated by reference in applicable resource discussions in Chapters 3 and 4. These documents were also made available as supporting appendices at the Environmental Reports page for this EA on the TVA external web site at tva.gov or tva.com).

1.4. The Scoping Process

TVA has developed the scope of this environmental review through a formal public scoping process. TVA initiated the scoping process by publishing a Notice of Intent (NOI) in the *Federal Register* on January 29, 2010. The NOI provided a summary of the proposed Action, including relevant details about the Project, identified a preliminary list of environmental issues that TVA planned to include in the environmental review, and invited agencies and the public to submit written or e-mail comments on the scope of the environmental review and alternatives. In the NOI TVA identified that, as appropriate, either an EA or EIS will be prepared for the proposed action. If TVA determines through this evaluation that the Project would have no significant impacts, it would place the final EA and a finding of no significant impact (FONSI) on its external web site for environmental reviews, and the environmental review process would be deemed complete. Alternatively, if TVA determines that the proposed Action would result in significant impacts, TVA would continue the environmental review process through the preparation of an EIS. An EIS would be developed using the results of the EA and supporting studies and the draft EIS made available for public comment per NEPA, Council on Environmental Quality (CEQ) regulations, and TVA procedures for implementing the law. Based on these environmental analyses, TVA would make a final decision whether to purchase power from the Project and document this decision in a Record of Decision (ROD). The United States Environmental Protection Act (USEPA) would publish Notices of Availability for the draft and final EISs in the Federal Register.

In order to ensure that stakeholders were given the opportunity to provide input to the scoping process, TVA mailed a copy of the NOI and a Project Area map, complete with cover letter, to over 50 federal, state, county, and local agencies and officials, and private environmental groups and organizations (see Chapter 6.0 for a list of recipients). TVA also provided public notice of the proposed Action through publications in local newspapers in Ashley, Wishek, and Bismarck, North Dakota, and Knoxville, Tennessee in January 2010. The public notice published in the local newspapers provided an abbreviated description of the Action, the Project, and environmental review process, and directed interested parties to local public libraries or the TVA website for additional information. TVA again invited comments from the public in written form.

The public scoping comment period opened on January 29, 2010, the date the NOI was published in the *Federal Register*, and ended one month later, on February 28, 2010. TVA received a total of 13 comment letters, including five from federal agencies, six from state agencies, one from an environmental group, and one from a member of the public. The comments generally focused on concerns related to various resource areas and suggested mitigation measures, and also identified potentially applicable laws, permits, and regulatory processes and provided suggestions for the scope of the discussions of cumulative impacts and alternatives. A copy of the NOI and the written comment letters received from agencies and the public during the scoping periods are included in Appendix A.

Based upon internal scoping, identification of applicable laws, regulations, executive orders and policies, as well as the input received through the public scoping process, TVA has identified the resource areas and issues listed below for analysis within this EA:

- Geology, Topography, and Soils
- Water Resources
- Biological Resources

- Cultural Resources
- Land Use
- Recreational Resources
- Visual Resources
- Noise
- Air Quality and Climate Change
- Socioeconomics
- Transportation
- Communication Resources
- Public Safety
- Public Services
- Environmental Justice

The analysis of each of these resource areas also includes a discussion of cumulative impacts, as well as proposed mitigation measures where appropriate.

Additionally, in early November 2010 TVA has noticed the availability of this draft EA for a 30-day public review period in newspapers in Bismarck and Ashley ND; and Knoxville, TN; made a general news release to media; placed hard copies of the document in libraries in Bismarck and Ashley ND, as well as Knoxville, TN; and sent cd copies of the document to more than 50 agencies, organizations and interested individuals.

1.5. Necessary Federal Permits or Licenses

TVA is conducting this EA to satisfy the requirements of the environmental review process prescribed by NEPA and implementing regulations.

TVA also has consulted with the following agencies regarding the Action's conformance with the following laws:

- United States Army Corps of Engineers (USACE) – Section 404 of the Clean Water Act (CWA)
- United States Fish and Wildlife Service (USFWS) – Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA) and Section 7 of the Endangered Species Act (ESA)
- North Dakota State Historic Preservation Office (SHPO) – Section 106 of the National Historic Preservation Act (NHPA)
- Federal Aviation Administration (FAA) – Determination of No Hazard
- USEPA – Wetlands Executive Order (EO) 11990

The Action's conformance with each these federal authorities is discussed in this EA.

CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter explains the rationale for identifying alternatives to consider for further evaluation and describes each alternative. It also provides a comparison of the alternatives with respect to their environmental consequences and identifies the preferred alternative.

2.1. Alternatives

The proposed Action consists of two separate, but linked components: (1) the purchase of renewable power generated by the Project under the PPA; and (2) the construction and operation of the Project. The latter action is a consequence of the former action. TVA's Integrated Resource Plan (Energy Vision 2020, TVA 1995), from which this review tiers, considered a suite of reasonable alternatives to the proposed action in this environmental assessment.

Alternatives to the first component of the Action include the execution of one or more PPAs for the sale of power from other renewable or clean energy generation projects. In December of 2008, TVA issued a competitive Request for Proposals (RFP) seeking proposals for renewable energy projects from which it could purchase power. CPV's Project was selected among numerous other responses to the RFP. Through the RFP process TVA evaluated a number of alternative proposals before entering into a NEPA-contingent PPA with CPV. This broad suite of proposals for renewable and clean energy power projects were initially screened on their projected ability to provide reliable and cost-effective power to TVA; their geographical location; the degree to which major environmental issues were likely to be encountered; and whether or not firm transmission capacity was likely to be available (also affecting not only cost but the degree to which additional transmission-related environmental effects would occur).

2.1.1. Siting Alternatives and Transmission Considerations

Alternatives to the second component (2) of the proposed Action include alternative Project areas or alternative Project layouts within the proposed Project Area. The feasibility of alternative Project areas is limited by a number of factors fundamental to the viability of the proposed Project. As an inherent component of the selection of the Project Area, the Developer has evaluated alternative locations for wind energy development and has taken these factors into consideration. The proposed Project Area has been selected based on a number of favorable aspects for wind energy development, including but not limited to: energetic wind resource; proximity to existing transmission lines; receptive local government and community; favorable state regulatory process for wind energy; and limited potential impacts to environmental, land use, or other existing resources. No other location was superior overall with respect to these features.

The general vicinity of the Project Area was selected after an extensive search in North Dakota and South Dakota by the Developer for an optimal location that would minimize potential environmental concerns and also satisfy the necessary economics. The site selected had the rare combination of a superb wind resource coupled with multiple on-site high voltage transmission lines. This substantially benefited the Project's economics while

minimizing impacts on the environment predominantly by eliminating the need for the construction of additional new aboveground transmission lines.

2.1.2. Siting Configuration and Actions Taken to Minimize Surface Disturbance

In developing the Project, the Developer has also considered alternative 200 MW layout configurations in the Project Area. The Developer has designed the proposed Project layout to optimize electrical generation and efficiency based on the existing wind resource and required and voluntary setbacks from environmentally sensitive areas, roads, residences, and other restricted areas defined in the landowner Easement Agreements and applicable local, state, or federal permit conditions. The Developer has used a comprehensive micrositing process during this design that began in late 2008 and has continued through review with the PSC and TVA as well as through the current consultations with the USFWS, SHPO and federally recognized tribes. Since initial micrositing began, CPV has made numerous adjustments to the locations of turbines and their associated structures due to considerations such as:

- Maximizing wind energy potential.
- Minimizing the amount of required road construction.
- Maximizing the use of existing road infrastructure.
- Minimizing the amount of required collection line, thereby eliminating the need for the construction of an aboveground collection system.
- Providing setbacks from occupied structures to minimize potential impacts from sound or shadow flicker.
- Minimizing impacts to wetlands to the extent practicable.
- Providing setbacks from environmentally sensitive areas such as piping plover critical habitat and USFWS WPAs.
- Providing setbacks from culturally sensitive areas.
- Providing setbacks from non-participating properties.
- Reducing impacts to native prairie and potential Dakota skipper habitats to the extent practicable.
- Efficiently utilizing the complex terrain.
- Providing setbacks from existing roads, utility infrastructure and microwave beam paths.

Through the design and engineering process, the Developer has worked to reduce the temporary and permanent Project footprint in order to minimize the physical impacts of the Project. These efforts have included: using access roads instead of cross-country turbine construction crane walks to the maximum extent practicable; co-siting of access roads and collection lines where practicable; and use of existing county roads wherever possible instead of constructing new access roads. Through these measures, CPV has preemptively mitigated potential surface disturbance within the Project Area.

In addition, during construction activities, surface disturbances would be reduced to the maximum extent practicable. Following construction, CPV would restore disturbed areas other than the area of the immediate turbine foundations to pre-construction conditions to

extent practicable. Soil erosion, compaction, and other related disturbance would be minor and short-term, and would be minimized by implementing environmental protection measures in accordance with the SWPPP. These measures would include BMPs for erosion and sediment control, such as temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. If cuts are made during construction, top soil would be segregated and reapplied after final contours have been graded. Upland runoff would be diverted around exposed soils, and riprap, mesh, burlap blankets, or other appropriate controls would be used to hold segregated topsoil during construction. Care would also be taken during construction of the Project to minimize soil blowing and water erosion to mitigate potential impacts to adjacent farmlands. 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 the Project.

Project design and layout has avoided surface waters and wetlands to the extent practicable for construction and operation of the Project. The Developer has submitted a pre-construction inventory of existing surface waters and wetlands crossed by the Project to the PSC, and will submit updates regarding impacts on those features to the PSC and applicable agencies should they be altered based on the finalized Project layout prior to construction. Floodplains would not be affected by the Project. As proposed and currently planned, prior Project authorization under a Section 404 USACE Nationwide Permit (NWP) is not anticipated to be required. However, the Developer would obtain a NWP if impacts on CWA jurisdictional waters are unavoidable and less than 0.5 acre, or an Individual Permit for unavoidable wetlands impacts that exceed this threshold. If applicable such as case, permanent impacts on jurisdictional waters would be mitigated according to USACE requirements in keeping with its policy of no net loss of wetland acreage and function. Per the request of the FAA, any potential wetland mitigation site selection (if proposed) would be based on FAA guidelines so that mitigation areas do not create a hazardous wildlife attractant to surrounding airports.

If applicable, NWP specific General and/or Regional Conditions prescribed for projects in North Dakota as set forth by the USACE and other applicable BMPs would, in addition to those identified herein, be used during construction and operation of the Project to protect topsoil, minimize soil erosion and protect adjacent wetland resources from direct and indirect impacts. Practices such as containing excavated material, use of silt fences, protecting exposed soil, stabilizing restored material, and re-vegetating disturbed areas with native species are currently planned to mitigate any potential impacts on surface waters. Runoff from the upper portions of watersheds adjacent to access roads would be allowed to flow unrestricted to the lower portion of the watershed. A Notice of Intent (NOI) to obtain coverage under the NPDES general permit for storm water discharges associated with construction activity would be submitted to the NDDOH prior to construction of the Project.

The Project is also designed to avoid impacts on wetlands under USFWS wetland easements in the Project Area. In the unlikely event the Project would impact such a wetland under USFWS easement, the Project would obtain a USFWS Special Use Permit, a Right-of-Way Permit, and any additional review under NEPA would be conducted. If boring for underground collection is required beneath wetlands within USFWS wetland easements, CPV would give USFWS prior notice. Neither circumstance is currently anticipated to be necessary.

Through careful Project micrositing and based on the results of the native prairie survey (Appendix C), the Proposed Action has mitigated impacts to native prairie from earlier potential configurations. For example, the Proposed Action moved six turbines out of native prairie and reduced collection line impacts by 27 acres compared to the initial Project layouts by collocating collection lines with access roads in many areas and collocating multiple collection lines within a single path.

CPV also met with a USFWS representative at the Kulm Wetland Management District Office to discuss the Project during initial Project development. Following this conversation, CPV was able to shift the Project location to minimize impacts to USFWS Waterfowl Production Areas (WPAs) and Grassland Easement areas. In addition, the landowners and the local population supported the Project. As a result, land acquisition was very successful and CPV has had flexibility in siting wind turbines across the land under easement. Finally, the Project site under consideration was placed as far east as possible, limited by conflicts with competing wind energy developers, to avoid or minimize the Project's presence in the 200-mile (mi) whooping crane migration corridor.

Impacts on the single microwave beam path crossing the Project Area have been preemptively avoided through the siting of Project components outside of the WCFZ as shown on Figure 2-3. Although not anticipated, impacts on LMR could be mitigated, if necessary, by installing repeater antennas on met towers in the Project. In its Easement Agreements with Project landowners, CPV commits to using reasonable efforts to correct any unanticipated degradation to television reception.

Early in Project planning, CPV contracted with Aviation Systems, Inc. to conduct a desktop evaluation of the Project from the perspectives of air traffic and aviation. CPV has proactively used the results of that September 2009 evaluation in developing a Project Area at a sufficient distance from local airports such that no impacts on air traffic are expected (Figure 3-8). CPV has submitted a Notice of Proposed Construction or Alteration to the FAA in accordance with Federal Aviation Regulations (FAR), Part 77. Turbine locations were submitted for review by the FAA. The FAA issued a "Determination Of No Hazard To Air Navigation" with respect to all turbines of the Project's on February 24, 2010 (Appendix L).

The Project Area was defined following this extensive screening efforts to address constraints and minimize the footprint of the Project. TVA recognizes that the Developer has established Easement Agreements specifically for wind energy development with private landowners within the Project Area. Since the Project layout has been developed through an iterative design process that has accounted for these numerous and complex local siting factors, alternative 200 MW Project layouts were not considered reasonable for further detailed consideration in this environmental review.

2.1.3. Alternative A – The No Action Alternative

The No Action Alternative is defined as TVA not purchasing renewable power generated by the Project under the 20-year PPA from CPV. As such, there would be no federal involvement in the Project. If this alternative is chosen, CPV could decide to construct the Project without a PPA in place with TVA. However, the Project may not be economically viable without this or a PPA with another power utility. Therefore, under the No Action Alternative, it is assumed that without TVA involvement, the Project would not be constructed and operated.

2.1.4. Alternative B – Proposed Action

Under the Proposed Action, TVA would purchase up to 200 MW of renewable energy from CPV. In order to supply this renewable energy, CPV would construct and operate the proposed Project. The Project would interconnect to the MISO electric grid via an existing 230-kV MDU transmission line located on site. Under the NEPA, TVA considers the Action to consist of both the purchase renewable power under the PPA and the construction and operation of the proposed Project. Because the execution of the PPA is a contractual rather than physical action, the scope of environmental consequences evaluated in this EA under the Proposed Action focus on impacts related to the construction and operation of the Project.

Project Area
The proposed Project is located in south-central North Dakota, within McIntosh County, approximately six mi north of the city of Ashley (Figure 1-1). The Project Area is defined as approximately 17,400 acres of private land under easement with CPV where the Project facilities would be located. The Project Area primarily consists of grasslands, pasture, and cultivated cropland (wheat, soybeans, sunflowers, and corn) with a few rural residences and farmsteads. On-site meteorological (met) data has demonstrated that the Project Area is well-suited for a wind energy generation facility based on the observed resource conditions and long-term projections. Two existing high voltage transmission lines, a MDU 230-kV line and a Basin Electric Power Cooperative 345-kV line pass through the Project Area. Some conservation easements, including Conservation Reserve Program (CRP) land, USFWS grassland easements, and USFWS wetland easements, are present within the Project Area; however the Project footprint would not be located within any USFWS grassland easements. The Project Area is characterized by rolling hills, interspersed with isolated glacial pothole wetlands.

Project Layout
The Project would consist of up to 87 wind turbines and ancillary infrastructure (Figure 2-1), including: improvements to existing roads; construction of new gravel access roads; installation of underground electrical collection lines; construction of an operation and maintenance (O&M) building; erection of up to four 80- to 90-meter (m) tall permanent met towers as well as the potential installation of temporary Sonic Detection And Ranging (SODAR) units; and construction of an interconnection substation facility. A temporary staging and laydown area, as well as a temporary batch plant, are also planned for the construction phase of the Project. The network of access roads, O&M building, and location of any on-site facility operating structures would utilize civil works and minimize disturbance on the site, yet provide optimal access to all turbines during operations.

Wind Turbines
The Developer has identified two preferred wind turbine generator models for use at the Project; however, the Developer may select alternate models representative of the same turbine class. The selected turbine type may affect the number of turbines and configuration of the turbine layout. The preferred turbine models are the Siemens Energy, Inc. (Siemens) SWT 2.3-101 and the General Electric (GE) 2.5xl. The wind turbine generator to be used will fall between 2.3 and 2.5 MW per unit in generating capacity, 80 to 85 m in hub height, and up to 103 m in rotor diameter. Depending on the model selected, the Project could install up to 87 turbines to meet full generation capacity. The exact turbine model to be used is subject to change in order to ensure that the turbine model ultimately selected is both cost-effective and optimizes land and wind resources.

Each Siemens SWT 2.3-101 turbine has a capacity of 2.3-MW, an 80-m hub height, and a 101-meter rotor diameter. The rotor swept area is 8,000 square meters (m^2) and the rotor speed may range from 6 to 16 rotations per minute (rpm). The wind turbine tower would consist of a tapered tubular steel tower, while the rotor would consist of a three-bladed cantilevered construction with a yawing system that would rotate it to stay upwind of the tower. The power output would be controlled by pitch regulation, with a variable rotor speed to maximize efficiency. The wind turbine would operate automatically, self starting at the cut-in speed of approximately 4 meters per second (m/s) and shutting down at or above the cut-out speed of 25 m/s. Rated power is achieved at approximately 12 to 13 m/s and the wind turbine would regulate to maintain the rated power. If this turbine is used at the proposed Project, 87 units would be constructed in rows running from southwest to northeast (Figure 2-1). Within rows, turbines are expected to be spaced approximately 0.25 mi apart while the rows themselves are expected to be spaced approximately 0.75 to 1.25 mi apart.

The GE 2.5xl turbine has a capacity of 2.5 MW, an 85-m hub height, and a 100-m or 103-m diameter rotor. The rotor swept area is either 7,854 m^2 or 8,332 m^2 and maximum rotor speed is approximately 14 rpm. The tower would consist of a tubular steel tower, and the rotor would consist of a three-bladed cantilevered construction with yawing system. As with the SWT 2.3-101, the power output would be controlled by pitch regulation, with a variable rotor speed to maximize efficiency. The wind turbine would operate at or above the cut-in speed of approximately 3 m/s, and would shut down at or above the cut-out speed of 25 m/s. Rated power is achieved at approximately 12.5 m/s; once achieved, the wind turbine would regulate to maintain the rated power. For this turbine, 80 units would be constructed at the Project within the same rows and locations described for the SWT 2.3-101. The only difference between the layouts for the GE 2.5xl and the SWT 2.3 101 is that seven of the turbine locations (and their corresponding access roads, crane crawl paths and collection lines) in Figure 2-1 would not be used for the GE 2.5xl.

Regardless of the turbine model selected for the Project, the foundation design would be an engineered foundation as required per the soil conditions and turbine manufacturer recommendations. The final design parameters of the foundations at the Project would be based upon geotechnical surveys, turbine tower load specifications, and cost considerations. Foundations for turbines are expected to have a volume of approximately 400 cubic yards and be constructed primarily from concrete and steel. The most common foundation shape is a spread footing, which can range in depth from approximately 7 to 10 ft and can range in width from approximately 16 to 20 ft at the top of the foundation to approximately 48 to 60 ft at the bottom of the foundation.

The extent of environmental impacts of these two turbine models varies based on the environmental resource in consideration. Use of the SWT 2.3-101 would require the greater number of total turbines (87) and therefore represents the most comprehensive study area (i.e., greatest physical ground disturbance). Alternatively, should the Project use GE 2.5xl turbines, only 80 of the 87 turbine locations would be required, resulting in less ground disturbance; however, because the GE 2.5xl turbines are the larger of the two preferred models, they may have greater effects on certain environmental conditions (e.g., visual resources) than the SWT 2.3-101. Figure 2-2 provides a schematic illustrating the ranges of the dimensions of the two preferred wind turbine generators. In order to conduct the most conservative evaluation possible, the environmental consequences for the various resources in Chapter 4.0 are based upon the most conservative turbine characteristics for that particular resource.

Table 2-1 provides further detail on the proposed temporary (construction) and permanent (operational) impacts associated with the Project for each component depending on the turbine model selected.

Table 2-1. Estimated Project Footprint

Project Component	Temporary Disturbance Only (Acres)	Permanent Disturbance Only (Acres)	Total Impact (Acres)
Turbines	235	16	251
Access Roads	117	55	172
Miscellaneous Permanent Components (substation, O&M building, permanent met towers, met tower spur roads)	12.4	4.6	17
Miscellaneous Temporary Components (crane path, laydown area, batch plant, collection lines)	119.5	0	119.5
Total*	**403**	**73**	**476**

*Overlap Removed from Total Impact. Total footprint calculations use the 87-turbine Project layout (Figure 2-1). In comparison, the 80-turbine Project layout would have a minimum total footprint of at least 433 acres, of which 366 acres would be temporary impact only and 67 acres would be permanent impact only.

Figure 2-3 illustrates a sampling of the complexity of siting issues and setbacks the Developer has considered in the development of the Project layout as described in Chapter 2.1.

Electrical System

The Project would interconnect to the on-site MDU Wishek-to-Tatanka 230 kV transmission line. The electrical system would gather the individual electrical distribution systems from each turbine and turbine rows into the central step-up transformer and substation located on-site. The collection system would be below grade to minimize impact on the area. Each turbine would likely have a pad-mounted transformer stepping up the voltage to 34.5 kV to the centrally located substation on-site, which would step up the power to the 230 kV line rating. CPV is utilizing buried collection lines for all of the Project collection system and is minimizing the amount of these underground collection lines to the extent practicable to reduce energy line losses between the generation point and the substation. Typically, underground electrical collection lines and communication cables are co-located adjacent and parallel to Project access roads or along public rights-of-way or easements, wherever practicable, at a depth of approximately 4 ft. Where underground collection lines are not co-located in access roads, they most often take a more direct path from the point of generation back to the substation and would also be buried at a depth of approximately 4 ft. Figure 2-4 depicts the general path of energy from the Project to energy users. The substation location, collection lines, and 230 kV transmission line are depicted in Figure 2-1.

The Project interconnection would be designed per North American Electric Reliability Corporation (NERC) as well as MISO and MDU generator interconnection requirements. The Developer expects to execute a Large Generator Interconnection Agreement (LGIA) with MISO and MDU in the first half of 2011. The Project would be interconnected per the requirements of the LGIA as part of the overall MISO transmission system build-out and upgrades. However, the system build-out and upgrades represent a separate project.

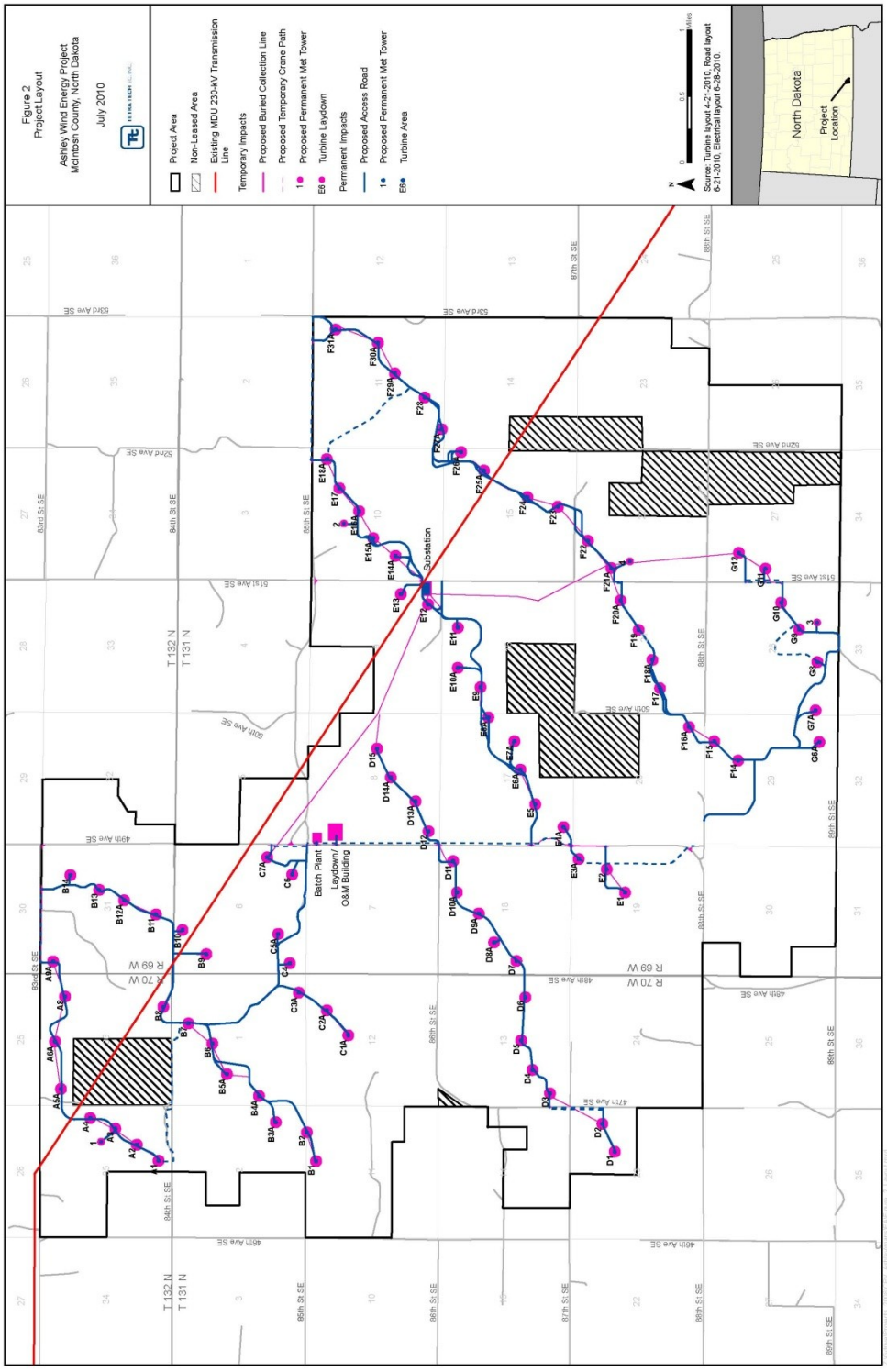

Figure 2-1. Project layout

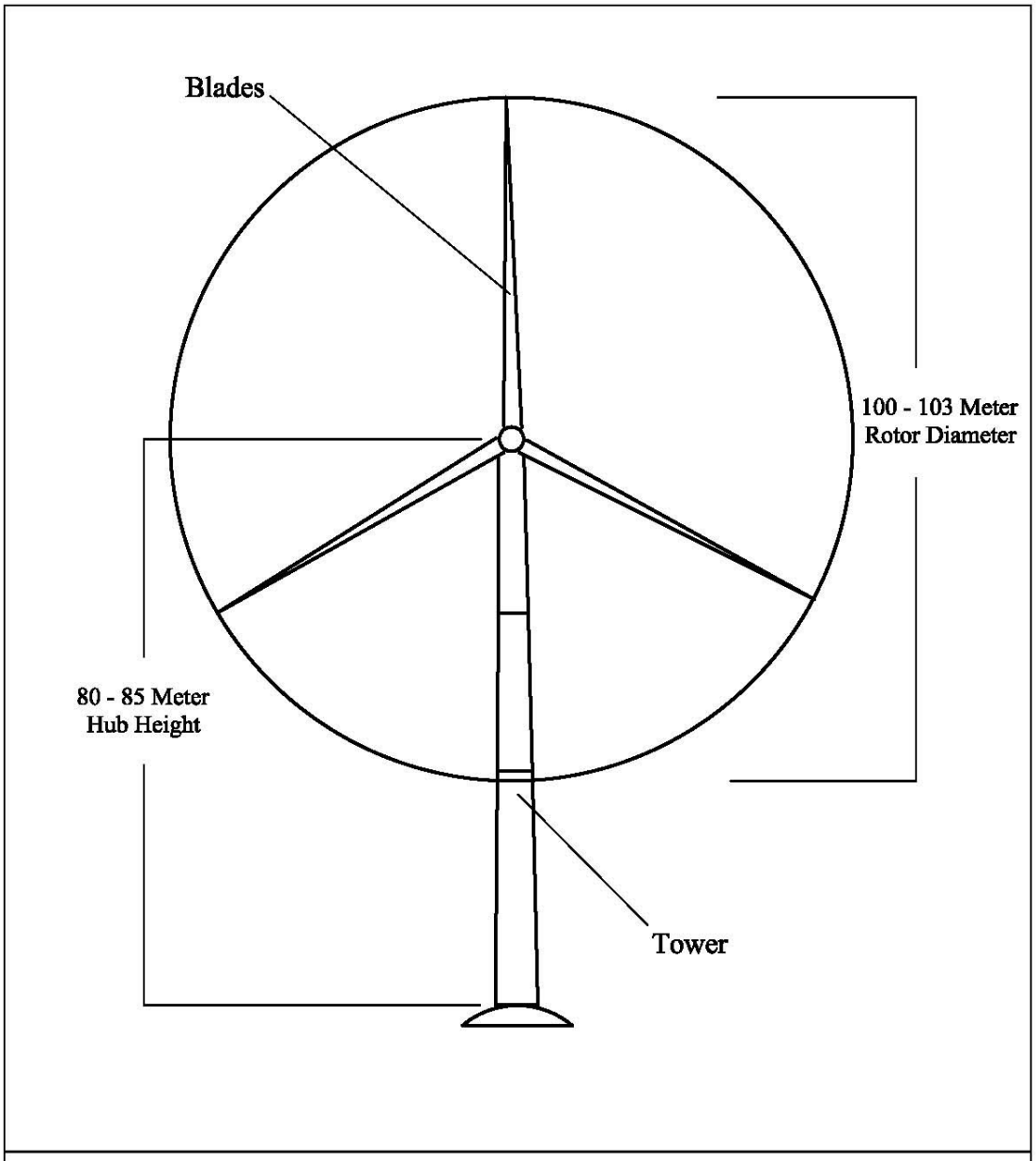

Figure 3
Preferred Wind Turbine Design Features

Ashley Wind Energy Project
McIntosh County, North Dakota

TETRA TECH EC, INC

Figure 2-2 Preferred Wind Turbine Generator Models

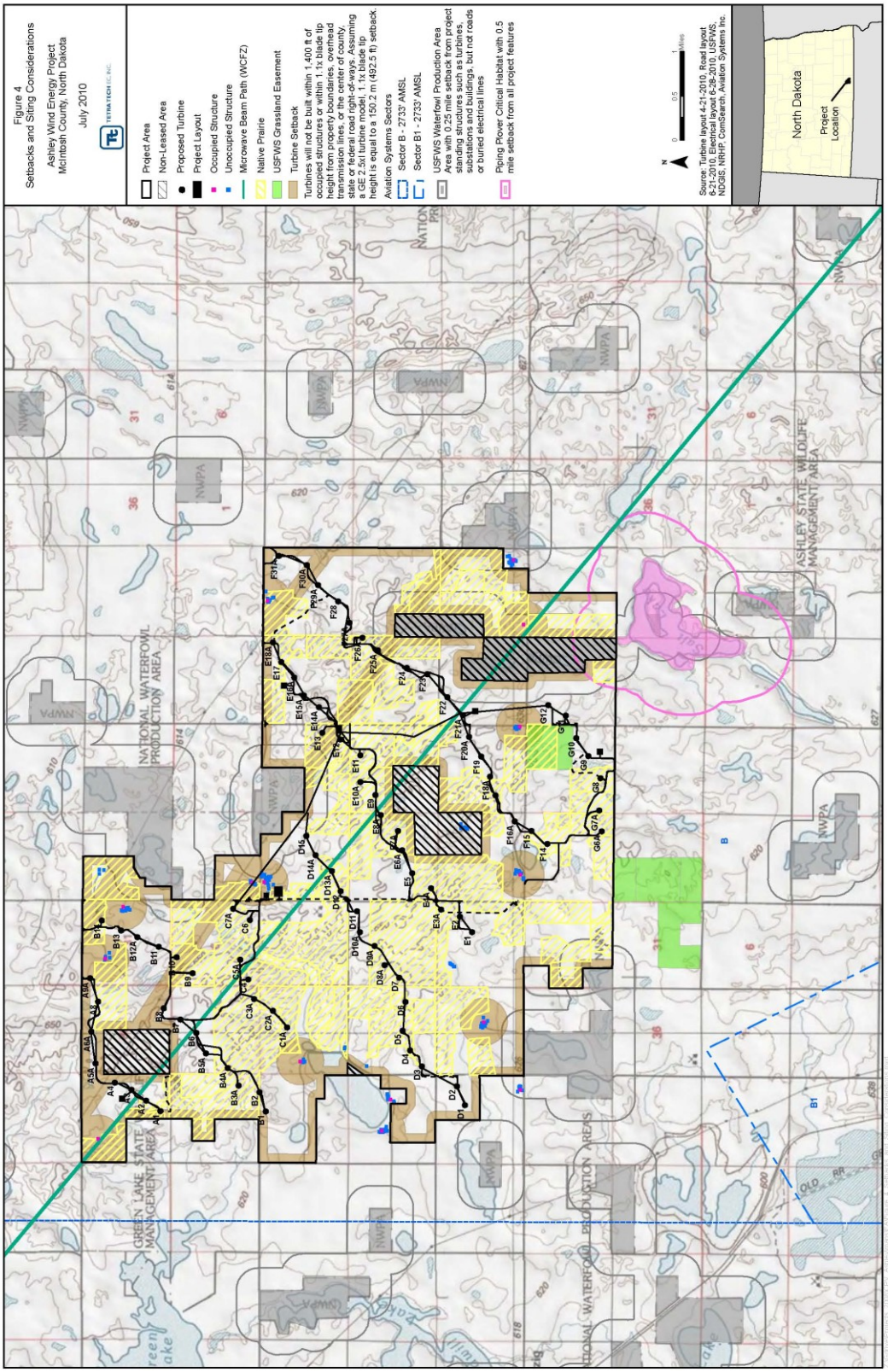

Figure 2-3. Setbacks and Siting Considerations

Though the Project would bear some cost for some MISO's transmission system upgrades as part of the MISO's regulatory framework and business practices, only the Project's onsite substation is dedicated for the use of the Project. Transmission upgrades beyond the Project onsite substation are not dedicated for the use of CPV and the Project solely but for the reliability and use of all generation and load in the MISO system. They have separate and independent utility, and will occur with or without this Project.

Road Improvements and Access Roads
Any improvements to existing public access roads would consist of re-grading and filling of the surface to allow access in inclement weather.

Turbine access roads would be constructed along turbine strings or arrays and in accordance with local requirements. They would be located to facilitate both construction and continued O&M. The roads would be covered with road base designed to allow passage under inclement weather conditions. The roads would consist of graded dirt and would be covered with an aggregate surface. Once construction is complete, the roads would be regraded, filled, and dressed as needed.

Project Construction
Construction activities expected for the Project and possible timeframes for their completion include:

- Geotechnical survey and analysis for proper foundation design and materials expected to occur in late 2010;
- Procurement of Project facility components expected to commence as early as mid 2011;
- Construction of access roads to be used for construction and maintenance expected to commence as early as mid 2011;
- Design and construction of the Project substation expected to commence as early as mid 2011;
- Installation of tower foundations expected to commence as early as mid 2011;
- Installation of underground cables and collection lines expected to commence as early as mid 2011;
- Tower assembly and wind turbine setting expected to occur as early as mid 2012;
- System testing of facility expected to occur as early as mid 2012; and
- Commencement of commercial production expected to occur during late 2012.

The final schedule of key construction milestones would be dependent upon receipt of necessary approvals and permits in advance of financial closing, and would be consistent with an on-line date of no later than late 2012. Project construction could begin as early as July 2011 and end as late as December 2012. Site preparation would begin in early 2011.

Construction Management
The Developer would hire an experienced engineering, procurement, and construction (EPC) firm with proven capabilities in complex power and industrial projects. The EPC firm would utilize a combination of direct hire employees, local trade subcontractors, subcontractors with wind experience, and necessary owned or rented construction equipment. Approximately 20 to 80 individuals would be employed during construction with the peak employment of 80 occurring at various times during the construction period.

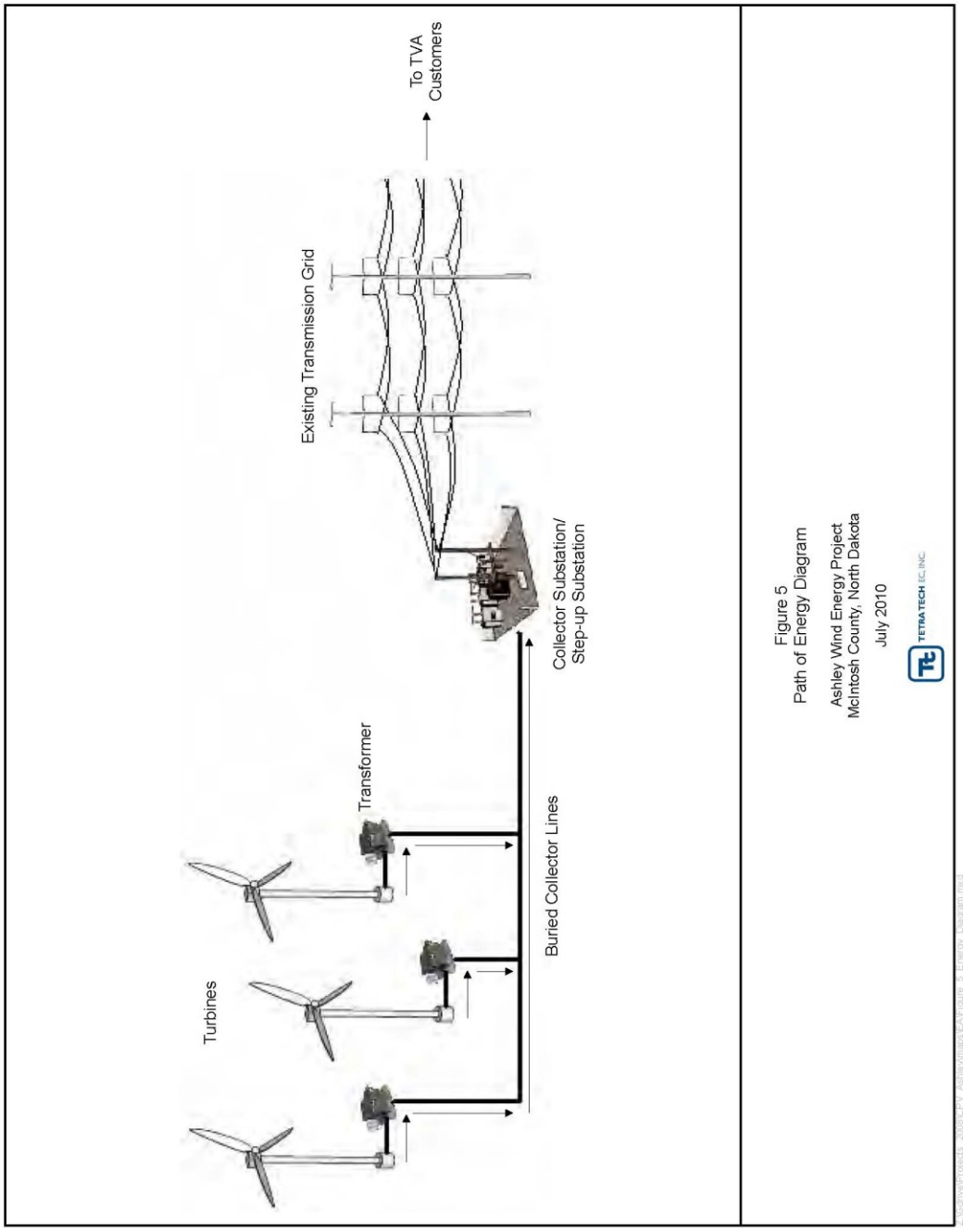

Figure 2-4. Path of Energy Diagram

The EPC firm would provide site project management, site supervision, procurement, site security, labor, and tools to construct and commission the facility. CPV would directly oversee the EPC firm with a CPV construction manager.

The EPC firm construction manager would be the lead and point of contact for all construction activities. The CPV construction manager would be the liaison for CPV with agencies, local officials, landowners, and the EPC firm. The CPV construction manager would remain in this role through the commissioning of the Project, at which point a CPV asset manager would assume responsibility for the Project. Following commissioning and the declaration of facility commercial operation, the O&M staff would take care, custody, and control of the facility from the construction organization.

Commissioning
The Project would be commissioned after completion of the construction phase. The Project would undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing would occur for each component of the wind turbines, as well as the communication system, meteorological system, obstruction lighting, high voltage collection and feeder system, and the Supervisory Control and Data Acquisition (SCADA) system.

Project Operation and Maintenance
The Operator engaged by CPV would be experienced in wind turbine operations and highly regarded in the industry. The Operator would employ a dedicated plant manager and O&M staff on-site. The O&M staff would have full responsibility for the facility to ensure O&M are conducted consistent with the approved permits, prudent industry practice, and equipment manufacturer recommendations for the turbines. It is expected that the wind turbine supplier would be contracted to perform the maintenance on the wind turbines for a period of two to five years in addition to the Operator. Approximately 16 people would be employed to operate and maintain the facility.

The maintenance schedule for the wind turbines and any balance of plant equipment would be consistent with prudent industry practices and equipment manufacturer recommendations. An initial maintenance inspection of each turbine would be performed after commercial operation. Following this initial inspection, each turbine would then receive annual inspections.

The turbines would be supplied with an on-board turbine control and monitoring system and a computerized analysis and data acquisition system. These systems would allow the Operator control and access/interface with the turbine remotely, and would include information on electrical and mechanical data, operation and fault status, meteorological data, and grid station data. A specific system is also expected that monitors the vibration level of the main components.

Specifically, the SCADA system would:

- Monitor wind farm status;
- Allow for autonomous turbine operation;
- Alert operations personnel to wind farm conditions requiring resolution;

- Provide a user/operator interface for controlling and monitoring wind turbines;
- Collect meteorological performance data from turbines; and
- Provide diagnostic capabilities.

These systems, along with a facility computerized maintenance and management system, would equip the Operator with the necessary tools and information for a robust predictive and preventive maintenance program and optimal operations and availability.

Decommissioning and Restoration
The Developer has made a commitment regarding decommissioning and restoration to all Project landowners in its Easement Agreements. The Developer has committed to dismantle and remove all equipment, improvements, fixtures and other property owned or installed in relation to the Project on the landowner property as part of the decommissioning and restoration process.

The Developer would conduct decommissioning and restoration consistent with the requirements of applicable regulatory agencies. The Developer reserves the right to consider alternatives to decommissioning, such as retrofitting the turbines and electric system with upgrades to extend the productive lifetime of the facility. The life of the facility is expected to be approximately 25 plus years absent upgrades.

2.2. Comparison of Alternatives

TVA has identified two reasonable alternatives for analysis in this environmental review: the No Action Alternative and the Proposed Action.

Under the No Action Alternative, no aspect of the Project would be built. As a result, environmental effects, both beneficial and detrimental, associated with construction and operation of the Proposed Action would not occur. Environmental conditions within the Project Area would be expected to persist in their current state. Most notably, the purpose and need for the proposed Action would not be fulfilled, and the benefits to TVA consumers would not be realized.

Under the Proposed Action, the Project would be built and operated as proposed. The environmental consequences described in Chapter 4 would likely occur, mitigated through the measures described in Chapter 5. TVA would satisfy its stated purpose and need by increasing its clean energy resources, and help meet demand for energy on its system as described in Chapter 1.

Table 2-2 summarizes the benefits and impacts of both alternatives following the implementation of proposed avoidance, minimization, and mitigation measures.

Table 2-2. Comparison of Alternatives

Resource	Proposed Action	No Action
Geology, Topography, and Sils	• Minimal impacts to geology and topography • 73 acres permanent soil disturbance, including 0.5 acre soil of statewide importance	• Geology, topography, and soils would persist in current state
Water Resources	• Construction of the Project may minimally impact surface water runoff • Minimal impacts to isolated wetlands from installation of collection line • Only impact to groundwater would be the need for one domestic-sized water well to satisfy the O&M building water requirements	• Water resources would persist in current state
Biological Resources	• 476 acres (including 223 acres of native prairie) of vegetation affected during construction • 73 acres (including 36 acres of native prairie) of vegetation permanently affected within Project footprint • No federally threatened or endangered species observed in Project Area • No population-level impacts anticipated to any species	• Biological resources would persist in current state
Cultural Resources	• No architectural properties recommended as eligible for NRHP • All archaeological sites found during survey would be avoided	• Cultural resources would persist in current state
Land Use	• Land use in project area would remain largely unchanged	• Existing land uses would continue in current state
Recreational Resources	• Visual impacts to public and private areas used for hunting, fishing, and nature observation • Negligible visual impacts to nearby golf course and city parks	• Recreational resources would continue in current state
Visual Resources	• Project area would retain overall rural visual characteristics • Modeling indicates one receptor, described as uninhabitable by the owner, would experience more than 30 hours per year of shadow flicker	• Visual resources would continue in current state
Noise	• Acoustic modeling results indicate the project is in compliance with EPA guidelines and HUD standards	• Noise environment would continue in current state
Air Quality and Climate Change	• Project may displace fossil fuel use, reducing greenhouse gas emissions • De minimis levels of air pollutants during construction; as well as during operations from operation traffic and maintenance equipment.	• Project would not contribute to reducing greenhouse gas emissions or air emissions

Table 2-2. Continued.

Resource	Proposed Action	No Action
Socioeconomics	• Project would contribute to county's tax base • Wages and salaries would benefit the regional economy • No impacts to property values anticipated	• Project would not contribute taxes, wages, salaries, or landowner payments
Transportation	• Almost 33 linear miles of new gravel access roads • Minimal impacts to local traffic anticipated during construction • FAA issued Determination of No Hazard for all proposed turbine locations	• Transportation facilities would continue in current state
Public Safety	• No adverse impacts from electromagnetic fields, hazardous materials, or hazardous waste anticipated • Project would have minimal impacts to safety and security	• Public safety environment would continue in current state
Public Services	• Negligible impacts anticipated to local housing stock, public services, and schools	• Public services would continue in current state
Environmental Justice	• No impacts expected on minority or low-income populations	• No direct, indirect, or cumulative environmental justice impacts

2.3. The Preferred Alternative

TVA's preferred alternative for fulfilling the stated purpose and need is the Alternative B, the Proposed Action. This secures for TVA and its customers approximately 200 MWs of renewable energy, helps meet TVA's renewable energy goals, and helps TVA meet the future demand for energy on the TVA system.

CHAPTER 3

3.0 AFFECTED ENVIRONMENT

This chapter describes the present condition of the affected environment of the Project Area, with focus on environmental resources or issues identified during the scoping process and agency consultation (Appendix A).

3.1. Geology, Topography, and Soils

3.1.1. Geology and Topography

South-central North Dakota lies within the Glaciated Missouri Plateau section of the Great Plains physiographic province. McIntosh County is located entirely within the Glaciated Missouri Plateau, spanning its two easternmost physiographic districts, the Missouri Coteau to the east and the Coteau Slope to the west. The Project Area is located entirely within the Missouri Coteau, an area of thick glacial sediments characterized by hilly topography and numerous, isolated small lakes and ponds that comprise a non-integrated drainage system (Clayton 1962).

The primary process responsible for shaping the physiography of the Project Area is large-scale glacial stagnation (i.e., long periods during which glaciers remained relatively static, neither advancing nor retreating) during the Wisconsin Glaciation. The topography of the Project Area is dominated by the Burnstad end moraine, a low, broad ridge of knobby hills with moderate local relief (typically 15 or 20 ft) and steep slopes (up to 15 degrees) that extend northwest from the Project Area to the northwestern portion of Logan County. The eastern extent of the Project Area varies slightly from the rest, consisting of dead-ice moraine characterized by more moderate topography and more numerous small waterbodies (Clayton 1962; NDGS 1980).

The surficial geology of the Project consists of end-moraine and dead-ice moraine glacial tills of Quaternary Coleharbor Formation. These tills are texturally heterogeneous (i.e., consisting of clays, silts, sands, gravel, and boulders) and are typically deep, ranging from 50 to 300 ft thick. Along the western extent, the sediments consist of collapsed glacial outwash sands and gravels (Clayton 1962; NDGS 1980).

The surficial sediments of the Project Area are underlain by the Upper Cretaceous Fox Hills and Pierre Formations. The Fox Hills is the younger of the two formations; however, both are flat-lying and their contact is not well defined in the area of the Project due to the thickness of surficial sediments and the lack of bedrock outcrops. Both formations were deposited in a marine environment. The Fox Hills formation consists of interbeds of weakly consolidated or unconsolidated sand and mudstone and well consolidated sandstone, siltstone, claystone, and shale. It is abundantly fossiliferous in some locations. The Pierre Formation is a thick unit of dark gray to black marine shale (Clayton 1962; NDGS 2001). Within the Project Area, both of these formations are deeply buried under surficial glacial sediments (Clayton 1962; NDGS 1980).

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

expected to be geologically stable (Bluemle 1991). This information is supported by United States Geological Survey (USGS) seismic hazard maps, which show that the Project Area is located in an area with very low seismic risk (USGS 2008). Related geologic hazards, such as soil liquefaction, are consequently also unlikely. Other potential geologic hazards, such as subsidence due to karst topography, have not been identified (Tobin and Weary 2005).

The primary geologic-related resources in McIntosh County are sand and gravel. These resources are extremely abundant (Clayton [1962] described them as "nearly unlimited"). USGS topographic maps depict two sand and gravel pits within the Project Area, one near the center and one at the western extent. The central facility corresponds to a 5-acre area mapped as "Pits, gravel and sand" by the United States Department of Agriculture (USDA) soils (SSURGO) database (USDA 2008). The Project Area is not located in an area with economic reserves of hydrocarbons, as supported by information from the North Dakota Industrial Commission (NDIC), Department of Mineral Resources, Oil and Gas Division (2009), including well locations, mapped oil and gas fields, and monthly oil and gas production totals.

3.1.2. Soils

North Dakota, including McIntosh County, was subject to glacial migration and as a result has surface boulders and scraped out depressions. Soils within a few feet of the surface are generally a fine loam with glacial till. The USDA has mapped 32 soil map units within the Project Area (Figure 3-1) (USDA 2008). These soils are primarily well-drained loams derived from underlying till, glaciofluvial sediments, and alluvial sediments. Five soil types comprise over 85 percent of the Project Area. The most extensive of these are "Zahl-Williams loams, 9 to 15 percent slopes" (approximately 33 percent of the Project Area), "Zahl-Williams loams, 6 to 9 percent slopes" (approximately 18 percent), and "Zahl-Max loams, 15 to 60 percent slopes" (approximately 16 percent). Table 3-1 provides a summary of the soil map units within the Project Area, including their acreages and percentages of the Project Area.

Approximately 2 percent of the soils within the Project Area are prime farmland, prime farmland if drained, or farmland of statewide importance (see Chapter 3.10 for more detail). More than half of the Project Area (64 percent) is underlain by partially hydric soils (i.e., soils containing hydric inclusions); however, soils classified as entirely hydric comprise only 4 percent of the Project Area (USDA 2008).

Although all of the soils in the Project Area (with the exception of areas mapped as "Water") have low to moderate susceptibility to erosion by water (i.e., K-factors from 0.1 to 0.4), the majority (81 percent) have a moderate to high susceptibility to wind erosion (i.e., USDA Wind Erosion Groups 5 or less) (USDA 2008).

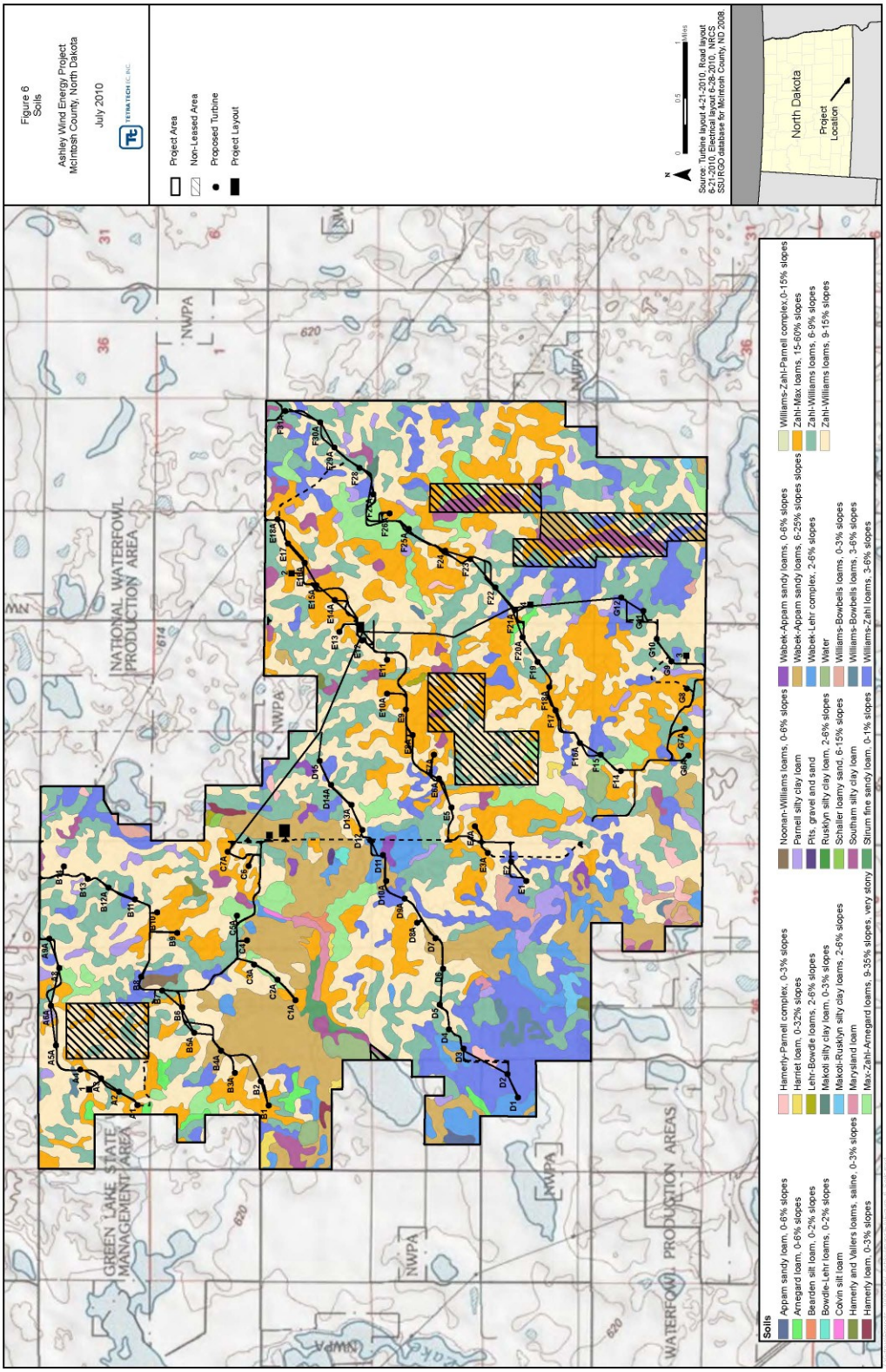

Figure 3-1. Soils

Table 3-1. SSURGO Soil Map Units within the Project Area

Map Unit Name	Area (acres)	Percentage of Project Area (17,385 acres)
Zahl-Williams loams, 9 to 15 percent slopes	5651	32.5
Zahl-Williams loams, 6 to 9 percent slopes	3126	18.0
Zahl-Max loams, 15 to 60 percent slopes	2725	15.7
Williams-Zahl loams, 3 to 6 percent slopes	1824	10.5
Wabek-Appam sandy loams, 6 to 25 percent slopes	1507	8.7
Max-Zahl-Arnegard loams, 9 to 35 percent slopes, very stony	664	3.8
Wabek-Lehr complex, 2 to 6 percent slopes	472	2.7
Parnell silty clay loam	338	1.9
Southam silty clay loam	264	1.5
Williams-Bowbells loams, 0 to 3 percent slopes	105	0.6
Water	105	0.6
Arnegard loam, 0 to 6 percent slopes	87	0.5
Williams-Bowbells loams, 3 to 6 percent slopes	73	0.4
Hamerly-Parnell complex, 0 to 3 percent slopes	61	0.4
Wabek-Appam sandy loams, 0 to 6 percent slopes	56	0.3
Marysland loam	52	0.3
Stirum fine sandy loam, 0 to 1 percent slopes	49	0.3
Harriet loam, 0 to 2 percent slopes	46	0.3
Makoti-Rusklyn silty clay loams, 2 to 6 percent slopes	37	0.2
Hamerly and Vallers loams, saline, 0 to 3 percent slopes	23	0.1
Hamerly loam, 0 to 3 percent slopes	22	0.1
Noonan-Williams loams, 0 to 6 percent slopes	18	0.1
Appam sandy loam, 0 to 6 percent slopes	16	0.1
Bearden silt loam, 0 to 2 percent slopes	15	0.1
Lehr-Bowdle loams, 2 to 6 percent slopes	11	0.1
Makoti silty clay loam, 0 to 3 percent slopes	10	0.1
Bowdle-Lehr loams, 0 to 2 percent slopes	10	0.1
Schaller loamy sand, 6 to 15 percent slopes	7	0.0
Colvin silt loam	6	0.0
Pits, gravel and sand	5	0.0
Williams-Zahl-Parnell complex, 0 to 15 percent slopes	1	0.0
Rusklyn silty clay loam, 2 to 6 percent slopes	0	0.0

Source: USDA 2008

3.2. Water Resources

3.2.1. Surface Waters and Floodplains

Situated in the West Missouri Coteau Watershed (Hydrologic Unit Code 10130106), the Project Area is located in the Rolling Soft Shale Plain of the Northern Great Plains Spring Wheat Region (USDA 2006). The West Missouri Coteau basin is 1,287,800 acres, located in three counties in south central North Dakota and four counties in north central South Dakota (NRCS 2009). The topography in the region contains nearly level plains that include prairie potholes and small glacial lakes. The elevation ranges from 1,650 ft in the east to approximately 3,600 ft in the west (USDA 2006). Drainage patterns within the watershed are poorly defined, with no major water courses. Many potholes and closed depressions occur. No defined streams occur in or adjacent to the Project Area (see Appendix B); however, three large named lakes occur just beyond the Project Area including Salt Lake near the southeast boundary of the Project Area, and both Green Lake and Pudwill Lake to the west. Overland surface flow from precipitation recharges the prairie pothole wetlands and lakes in the Project Area.

Prairie potholes are water-holding depressions of glacial origin. They typically range in size from a fraction of an acre to several square miles; few are more than five ft deep and most are less than two ft deep. Prairie potholes are fed by precipitation, by runoff from the pothole watershed and by groundwater inflow. Water loss from the pothole is caused by evapo-transpiration, surface overflow and groundwater outflow. Ephemeral to semipermanent potholes tend to have freshwater to brackish salinity and provide groundwater recharge, whereas semipermanent to permanent potholes receive groundwater discharge and are saline to hypersaline (NRCS 2009; Sloan 1972).

Surface water and floodplain resources were identified for the Project Area using Federal Emergency Management Act (FEMA) Flood Insurance Rate Maps (FIRM), USGS topographic maps, National Land Cover Dataset (NLCD), USFWS National Wetlands Inventory (NWI) data, and the National Hydrography Dataset. According to NLCD data, open water accounts for 1,417 acres, or 8 percent of the entire Project Area (Figure 3-2). Of these waters, none are listed as 303(d) impaired waters.

The extent of floodplains in the vicinity of the Project Area has not been mapped for floodplains in McIntosh County. However, the North Dakota State Water Commission acknowledged in a letter dated February 17, 2010 that the Project Area is not located in an identified floodplain and believes the Project would not affect an identified floodplain (see Appendix A).

3.2.2. Wetlands

The term wetlands is defined as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” (33 Code of Federal Regulations [CFR] 328.3(b); 2002). This definition, used by the USACE and the USEPA for implementing section 404 of the CWA, relies on diagnostic characters of hydrophytic vegetation, hydrology and hydric soils to distinguish wetlands from uplands or other nonwetland habitats.

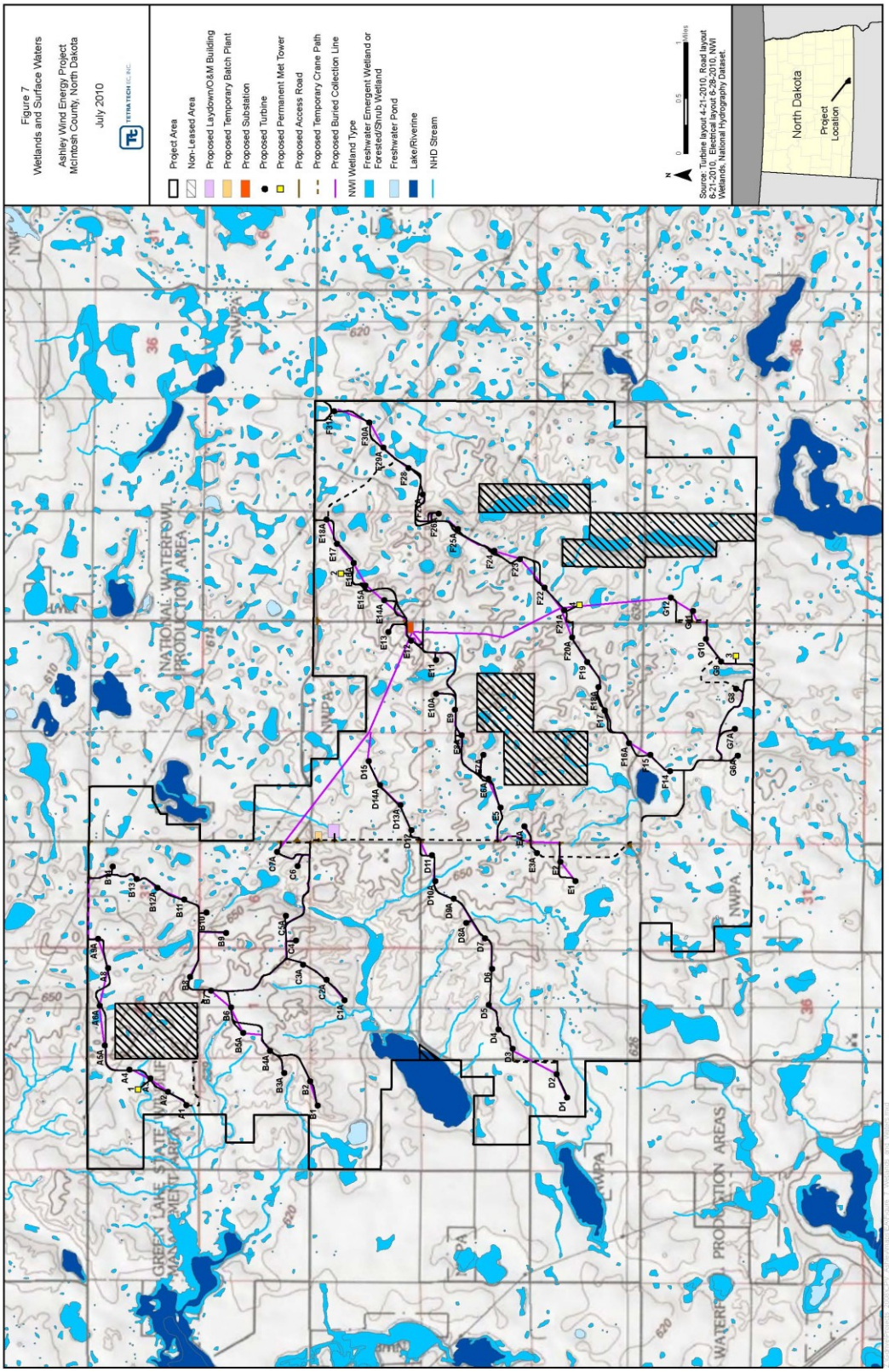

Figure 3-2. Wetlands and Surface Waters

The Project is located within the Northern Great Plains (Land Resource Region F), also known as the prairie pothole region. In this ecoregion, annual rainfall averages 14 to 31 inches and lands are subject to winds and periodic drought conditions. In general, vegetation is mixed and tall-grass prairie; vegetation of prairie pothole wetlands includes sedges, bulrushes, grasses, and forbs, but the composition varies greatly depending upon the hydrologic regime, salinity, current drought conditions, and extent of human disturbance (USACE 2008). Prairie potholes provide habitat for waterfowl and other migratory and resident wildlife.

Initially, desktop wetland analysis methods were used to identify wetlands and waterbodies within the Project Area. The desktop analysis included an assessment of data from the NWI and information from Natural Resources Conservation Service (NRCS), Wetland Reserve Program (WRP) easements, and North Dakota geographic information system (GIS). The desktop wetland analysis identified 1,067 acres or six percent of the Project Area classified as NWI wetlands (Figure 3-2). Additionally, the desktop wetland analysis identified 8,728 acres of property or 50 percent of the Project Area in USFWS wetland easements. These USFWS wetland easements are only applicable to the specific wetlands contained within the easement areas and do not cover the entire property on which they are recorded. Actual wetland acreage within these easements is substantially less than the easement areas. In many locations, the NWI wetlands and USFWS wetland easements overlap. NLCD data identified 11,041 acres or 63.5 percent of the Project Area as having partially hydric soils and 651 acres or approximately four percent of the Project Area as having hydric soils. Wetlands as mapped and publically available in GIS in the Project Area are shown in Figure 3-2.

In order to best assess the actual wetlands present in the Project Area that could be impacted by the proposed Project, the Developer conducted an on-site wetlands delineation in June and July 2010. The study area for the wetland delineation included the proposed construction area footprint of the proposed Project layout, as shown in Figure 2-1, plus an additional buffer of a 250-foot radius study area around turbines; a 75-foot study corridor across crane paths and new access roads; a 50-foot wide study corridor across existing county roads to be improved; a 60-foot-wide study corridor across new spur roads to the permanent meteorological towers; and a 30-foot-wide study corridor across buried electrical collection line locations. The delineation was performed using the methods described in the 1987 USACE Wetland Delineation Manual (Environmental Laboratory 1987) and Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (USACE 2010). These methods incorporate a three-parameter approach using vegetation, soils, and hydrology to identify the presence of freshwater wetlands. The extent of wetlands potentially subjected to federal regulation was determined by applying the USACE definition of Ordinary High Water Mark (OHWM) of surface waters and methods for jurisdictional determinations as detailed in the USACE Jurisdiction Determination Form Instructional Guidebook (Corps JD Guidebook) revised in 2007, including the December 2, 2008 USACE/USEPA revised Rapanos guidance.

The wetland delineation identified 82 wetlands within the Project study corridor; 18 other wetlands were observed and documented but did not overlap with the proposed Project footprint. Tetra Tech concluded that all 100 wetlands were consistent with the definition of “isolated waters” and therefore would not be subject to the CWA. The results of the field-based wetland delineation are also discussed in Chapter 4.2 and Appendix B of this EA.

EO 11990, Protection of Wetlands, requires that the TVA consider factors relevant to the Project's effect on the survival and quality of the wetlands affected by the action. Murkin (1998) describes several hydrologic functions that prairie pothole wetlands provide, including:

- *Control and storage of surface water* – This function is especially important during spring runoff and rainfall events when wetlands store excess precipitation and reduce the intensity of downstream flooding and soil erosion.

- *Recharge of groundwater supplies* – Wetlands that discharge groundwater may serve as local or regional groundwater sources.

- *Sinks for excess nutrients* – Through complex nutrient cycling and foodweb dynamics, wetlands reduce nutrient concentrations from waters.

- *Filters for sediments and chemicals* – Wetlands, especially shallow vegetated wetlands, reduce water flow and allow sediments and chemicals to settle out; waters that are discharged to the receiving watershed (e.g., overflow or groundwater) are likely to have reduced chemical and sediment concentrations.

- *Other hydrologic functions* – Wetlands may contribute to local rainfall; removal of wetlands may affect rainfall inputs and groundwater recharge.

The presence of USFWS conservation easements and WPAs near the Project Area demonstrate functions and values that prairie potholes provide to wildlife. According to the USFWS, nearly 95 percent of WPAs occur in the prairie pothole region; a third of these areas occur in North Dakota alone (USFWS undated). These wetlands provide habitat and forage for a wide variety of waterfowl, shorebirds, grassland birds, plants, insects and wildlife (USFWS 2009), including species protected by the ESA, the MBTA and the BGEPA. WPAs also offer societal values; these areas are generally open to the public and used for a variety of recreation purposes such as hunting, boating and bird watching among many others.

3.2.3. Groundwater

Groundwater is the primary source of water for municipal, domestic, and livestock needs in McIntosh County. Groundwater resources are available from aquifers in both surficial glacial sediments and Cretaceous bedrock. No sole-source aquifers have been designated in North Dakota.

Within the Project Area, the primary sources of groundwater are glacial surficial sediments and the Fox Hills Formation. Water from both sources is typically hard to very hard. Well yields within the Project Area are generally less than 50 gallons per minute (gpm) (Klausing 1981). Review of driller logs available from the NDSWC indicates that 16 private wells have been drilled within the Project Area, including 15 stock wells and one domestic well (see Chapter 4.2.1.1 for more details). Well logs indicate that static water levels in the Project Area range mainly from about 20 to 25 ft below ground surface (bgs); however, static water depths as shallow as 6 inches and as deep as 80 ft have also been recorded (NDSWC 2009).

Quality of groundwater varies, depending on the characters of the underlying geology (see Chapter 3.1). Groundwater that has been in contact with highly mineralized bedrock material for a long duration would similarly be mineralized or saline; conversely, groundwater found in shallow aquifers is less saline and more suitable for drinking, livestock and wildlife use, irrigation and other uses. Shallow aquifers are fed by rainfall and snowmelt and are in contact with mineralized soil for a relatively brief time.

3.3. Biological Resources

3.3.1. Vegetation

The Project encompasses land that is a mix of native prairie, grassland, pasture, and cropland (hay, corn, soybean, barley, and sunflower). Plant communities within the Project Area are dominated by large tracts of native and historically disturbed prairie with equal amounts of cultivated cropland and hay land. Native prairie consist primarily of mixed-grass prairie dominated by components of the short and tall-grass prairies that may include the species big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), and green needlegrass (*Stipa viridula*), with prairie cordgrass (*Spartina pectinata*) and northern reedgrass (*Calamagrostis stricta*) near wetlands. Common forbs found in the mixed grass prairie communities include western yarrow (*Achillea millefolium*), pussytoes (*Antennaria* spp.), fringed sagewort (*Artemisia frigida*), milk vetch (*Astragalus* spp.) and purple avens (*Geum rivale*). Prairie provides valuable habitat to a wide variety of upland bird species and prairie potholes provide critical nesting and brooding habitat to many species of waterfowl.

Cropland and pasture are managed for the production of livestock forage and cereal crops. Management may include fertilization, weed and brush control by pesticide application, fallow, and reseeding. Species composition often includes mixtures of introduced grasses, mixes of grasses and legumes, small grain hay or monocultures of legumes such as alfalfa or clover. Croplands are planted in the spring and may include wheat, barley, sunflower or corn with rotations to hayland crops in cycles. Cropped species are not static and tilled areas would fluctuate with market demands and farm-specific operational requirements.

Native prairie serves as a vital ecological resource by improving water quality, providing erosion control, and supporting a diverse population of plants and animals. However, due to native prairie's fertile soils and predominantly flat topography, large portions of the native prairie have been converted to agricultural lands. This widespread loss of native prairie makes this an ecosystem of conservation concern and among the rarest ecosystems in North America (Samson et al. 1998).

Native prairie serves as vital habitat for the Dakota skipper (*Hesperia dacotae*), a species of butterfly that is currently classified as a federal candidate species but has not been reported from McIntosh County. Native prairie are also important habitat used by prairie grouse (e.g., sharp-tailed grouse, greater prairie-chicken) for lekking, nesting, brood rearing, and wintering. Grouse lek habitat is classified as open, short grass vegetation with minimal amounts of agriculture. Development in grouse lekking habitat could result in direct habitat loss, habitat loss through avoidance, predator facilitation, and construction-related disturbance. Most prairie grouse are considered gamebirds and are often managed locally by state fish and game agencies for hunting purposes.

CPV has conducted a native prairie survey for the Project Area (see Appendix C). At the time of the survey (July 27 – August 14, 2009), a total of 8,520 acres (50 percent of Project Area) were classified as native prairie and 1,662 acres (10 percent of Project Area) were classified as tame grasslands (Figure 3-3; Table 3-2; Tetra Tech 2010). An additional 40 percent were either active crops (corn, alfalfa, soybeans) or grazing pastures for cattle. The largest contiguous areas of native prairie were found in the northwestern region of the Project Area (Tetra Tech 2010). None of the plant species identified are species listed by the state of North Dakota or federally protected as endangered, threatened or species of concern. Four species listed by the state of North Dakota as being noxious weeds were found in the native and tame grasslands: absinthe wormwood (*Artemisia abisinthium*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), and yellow toadflax (*Linum vulgaris*).

Table 3-2. Vegetative Land Cover within the Project Area

Vegetative Land Cover	Acreage	Percent of Vegetative Land Cover
Crop and Hay	6,777	40
Native Prairie	8,520	50
Tame Grassland	1,662	10
Other	59	<1
Total*	**17,018**	**100**

Source: Tetra Tech 2010
* Total acreage assessed during vegetation field survey is less than total Project Area as wetlands and waterways are not included.

3.3.2. Wildlife

Information on the existing wildlife in the Project Area was obtained from a variety of sources, including observations during site visits, on-site biological surveys, communication with local residents and information from the North Dakota Game and Fish Department (NDGFD), North Dakota Parks and Recreation Department (NDPRD), North Dakota Natural Heritage Inventory (NDNHI), University of North Dakota (UND) Environment-Natural Resources Extension Office, and USFWS.

Wildlife within the Project Area consists of birds, mammals, fish, reptiles, amphibians, and insects, both resident and migratory, which utilize the site habitat for foraging, migratory stopover, breeding and/or shelter. Species present in the Project vicinity are associated with agricultural fields, pasture grasslands, and wetland areas. Common mammals in the Project vicinity include raccoon (*Procyon lotor*), mink (*Mustela vison*), striped skunk (*Mephitis mephitis*), least weasel (*Mustela nivalis*), white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), badger (*Taxidea taxus*), porcupine (*Erethizon dorsatum*), and eastern cottontail (*Sylvigagus floridanus*).

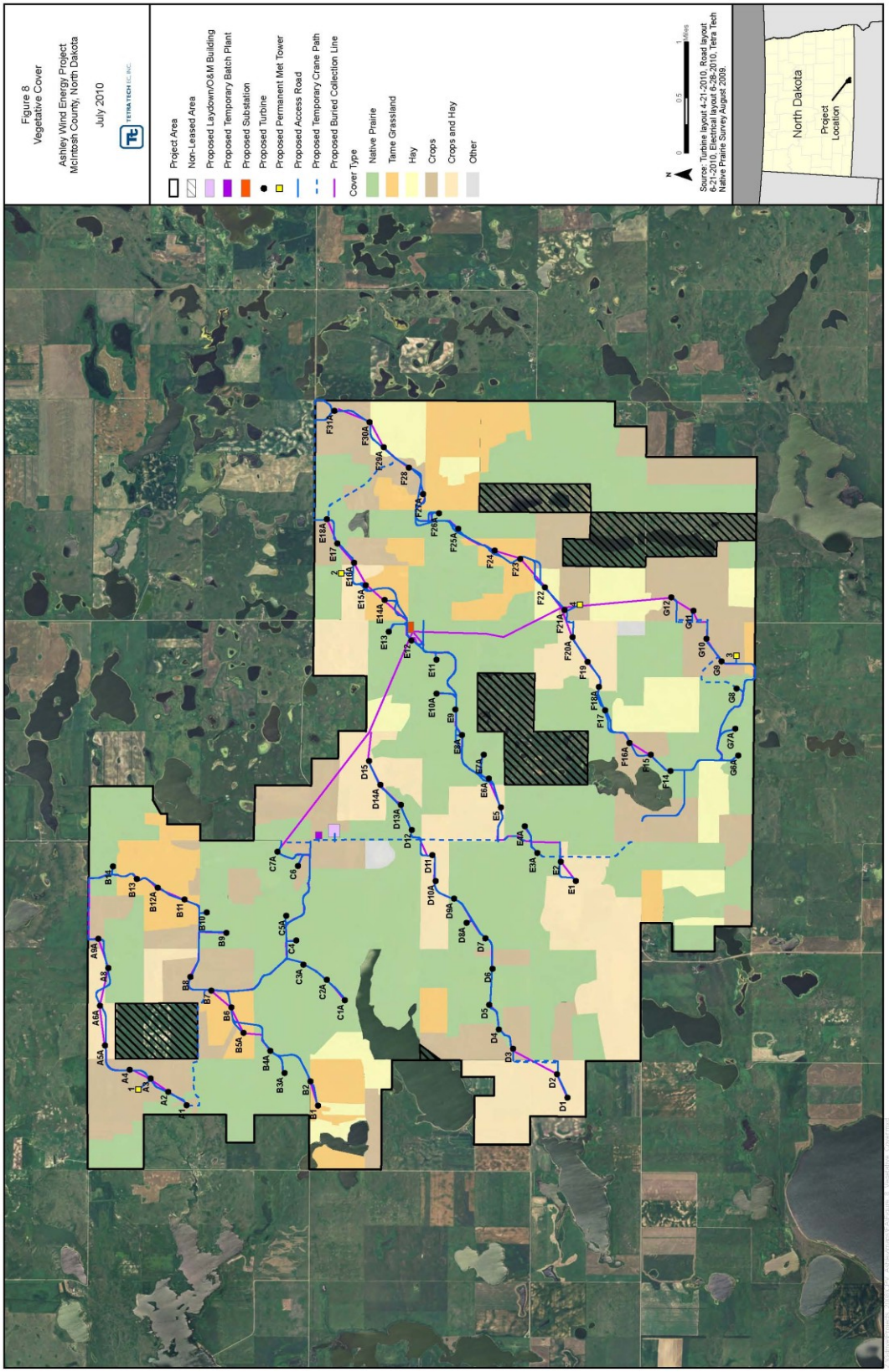

Figure 3-3. Vegetative Cover

Avian Species

North Dakota has 365 documented bird species (Faanes and Stewart 1982) and is situated within the Central Flyway, one of the main bird migratory routes (USFWS 2008a). A fall avian survey was conducted in 2009 by a trained and qualified ornithologist for the Project in order to quantify local avian use during the fall migratory period within the area and to identify potential avian impacts associated with building and/or operating the proposed facility (Tetra Tech 2010a; Appendix D). Weekly surveys were performed in the Project Area and in adjacent additional land subject to Easement Agreements between landowners and CPV between August 11 and October 31, 2009. Fixed point count surveys (800-m radius) were conducted at 7 points distributed throughout the study area. CPV also completed a Spring 2010 avian point count survey (Tetra Tech 2010e, Appendix D). The survey was conducted from March 23 to June 13, 2010, encompassing the spring migration and early summer breeding seasons. The same seven point count locations and methodology were used during fall and spring surveys. In addition to the spring point count surveys, raptor nest surveys to estimate the number of active and inactive raptor nests within the Project Area were also conducted. Raptor nest surveys did not include nest searches for ground-nesting raptor species.

Waterfowl, Waterbirds, and Cranes

Certain waterfowl and waterbird species, such as the Canada goose (*Branta canadensis*), snow goose (*Chen caerulescens*), American white pelican (*Pelecanus erythrorhynchos*), and American coot (*Fulica americana*) had high encounter rates during the Fall 2009 surveys but all of these species had low encounter rates during the Spring 2010 surveys. Encounter rate is the frequency with which a species flies at heights consistent with the anticipated rotor swept area (RSA); encounter rates greater than 10 birds flying within the RSA per 20 minutes (min) (as is the case for these species during the Fall 2009 survey; Appendix D) suggest the potential for negative turbine interactions. No waterfowl or waterbirds had encounter rates greater than 10 birds flying at RSA height/20 min during the Spring 2010 surveys.

Sandhill cranes (*Grus canadensis*) had the second highest encounter rate of all species observed during the Fall 2009 survey. All of the sandhill cranes were observed outside of the Project Area boundary; however, the observed flight direction suggested that the cranes had flown through the Project Area prior to observation. All observations were made on one day (October 31, 2009) at the end of the survey period. Sandhill cranes were not observed within the Project Area during the Spring 2010 survey.

Raptors

Most raptor species observed were seen infrequently or exhibited behaviors that should not put them at high risk of turbine collisions, indicating that negative turbine-related impacts are unlikely. Northern harriers (*Circus cyaneus*) and red-tailed hawks (*Buteo jamaicensis*) were the most commonly observed raptor species during the Fall 2009 surveys. Swainson's hawks (*Buteo swainsoni*) and great horned owls (*Bubo virginianus*) were the most commonly observed raptor species during the Spring 2010 surveys. With the exception of northern harriers (a ground-nesting species), all of these species were observed nesting within the Project Area during the spring raptor nest surveys. A list of other raptor species observed can be found in the Fall 2009 Avian Survey and the Spring 2010 Avian Survey in Appendix D.

Bats

Tetra Tech performed a bat likelihood of occurrence assessment for the Project (Appendix E). This assessment was based on habitat-based variables and species-based variables. Habitat-based variables include the amount of suitable foraging and roosting habitat, the number of natural areas, number of perennial streams, and number of human developments. Species-based variables included bat species known to occur in the region and behavioral characteristics. The likelihood assessment does not predict how many bats would occur or the anticipated bat mortality level, rather it provides an overall estimate of bat activity likely to occur and highlights geographical locations within the Project Area where bat activity might be highest.

Of the 46 bat species in the United States, 10 occur in North Dakota (ASM 2007); three of these are listed by the NDGFD as sensitive species (Hagen et al. 2005): western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*M. evotis*), and long-legged myotis (*M. volans*). None of the sensitive species are likely to occur in the Project Area. Six bat species are likely to occur: little brown myotis (*M. lucifugus*), northern long-eared myotis (*M. septentrionalis*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereu*) (Swier 2003; ASM 2007; Lacki et al. 2007; NatureServe 2008; WBWG 2009). When viewed on a regional scale, the Project Area contains less suitable bat habitat than the surrounding landscape, suggesting a low likelihood of occurrence for bat species across the Project Area (Tetra Tech 2010b).

3.3.3. Rare, Threatened and Endangered Species

No federally threatened or endangered species have been found within the Project Area to date, and, in the unlikely event that they do occur; potential impacts would be minimized by proposed avoidance and minimization measures. The ESA requires the protection of species that are federally listed as threatened or endangered. Significant changes to the habitats of these species, or projects that have the potential to result in "take," would require special permitting from the USFWS. According to the USFWS (2008b), of the federally listed species known to occur within North Dakota, only the whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), and gray wolf (*Canis lupus*) are listed in McIntosh County. Tetra Tech has included assessments of two other species: bald eagle (protected by BGEPA) and Dakota skipper (candidate species).

Whooping Crane

Whooping cranes are a regular spring and fall migrant in North Dakota. The whooping crane was considered endangered in the United States in 1970 and was 'grandfathered' into the ESA (Canadian Wildlife Service and USFWS 2007). Due to intensive management, the wild migratory (referred to as the Aransas-Wood Buffalo population) population has increased from 15 birds in 1941 to 263 as of the start of spring migration in 2010 (WCCA 2010). There are several factors which may threaten the whooping crane. These include human settlement and development, habitat loss, shooting, disturbance, disease, and predation. Threats to the whooping crane that are related to wind power development include collision with power lines, fences, and other structures, and loss and degradation of stopover and wintering habitat (CWS and USFWS 2007; USFWS 2009a). In North Dakota, whooping cranes have the potential to occur anywhere suitable feeding and roosting habitat is found; however, 94 percent of all documented whooping crane occurrences have been within a 200-mi corridor adjacent to the Missouri River (Austin and Richert 2001). The

Project is located on the eastern edge of the whooping crane migration corridor. Whooping cranes have been observed in McIntosh County (four adults in October 1992) but there are no records of a siting within the Project Area. While suitable habitat is present within the Project Area, the likelihood of a whooping crane using the Project Area is low mostly due to the Project's location relative to the whooping crane's migratory corridor and the existence of better habitat located in the surrounding region (Tetra Tech 2010c). The whooping crane likelihood of occurrence report is included in Appendix F.

Piping Plover

The piping plover is a small, migratory member of the shorebird family. Breeding individuals in the Great Plains population nest along the shores of alkali wetlands and on riverine shores and sandbars, preferably in areas with minimal vegetation (USFWS 1988). The piping plover is listed as a federally threatened species and a Level II Species of Conservation Priority in North Dakota, which indicates a moderate to high conservation priority (Hagen et al. 2005). Reasons for decline of the piping plover include habitat loss and nest depredation in the wetlands. The main reason for decline of the species along the Missouri River is habitat loss due to water development projects (e.g., Fort Peck Dam, Garrison Dam, and Oahe Dam) and loss of wetlands due to agriculture and other developments. As with most migratory birds, piping plovers could collide with power lines and other structures while on migration. The Project is located within the range of the piping plover and this species has been recorded in McIntosh County at nearby Salt Lake (Designated Critical Habitat by USFWS; Figure 2-3). However, no suitable piping plover breeding habitat exists within the Project Area.

Sprague's Pipit

The Sprague's pipit (*Anthus spraguii*) is a small songbird that is endemic to the Northern Great Plains (USFWS 2009 and references therein). During the breeding season (late April to early September), Sprague's pipits are more likely to be found in large (> 358 acres; Davis 2004 in USFWS 2010) patches of native prairie although they will utilize areas with non-native grasses if the vegetation structure is suitable (e.g., dense cover) and also will breed in lightly grazed rangeland (USFWS 2009). This species was recently listed as a candidate species under the ESA (USFWS 2010). The loss and fragmentation of native prairie habitat is listed as the primary cause of Sprague's pipit population declines. Suitable pipit habitat (rangeland, tame grassland, and native prairie) is found throughout the Project Area. In addition to point count surveys in Fall 2009 (mid-August to mid-November) and Spring 2010 (mid-March to mid-June), surveyors made a concerted effort during each week of the Spring 2010 survey season to perform walking surveys for pipits in all native prairie patches greater than 200 acres. No Sprague's pipits were observed within the Project Area during Fall 2009 or Spring 2010.

State Listed and Other Sensitive Avian Species

No federally threatened or endangered species have been observed in the Project Area. During avian surveys, three bald eagles (*Haliaeetus leucocephalus;* protected by the federal BGEPA) were observed flying at 400 m (i.e., above the RSA) outside of the Project Area boundary on August 22, 2009, and one bald eagle was observed flying at 30 m (at RSA height) outside the Project Area boundary at the same location of the fall observations on March 25, 2010. Due to the observed flight direction, it is possible the eagles passed through the Project Area prior to the observation. The bald eagle is federally protected

under the BGEPA and the MBTA. The bald eagle is listed by the state of North Dakota as a Level II Species of Conservation Priority, which indicates a moderate to high conservation priority (Hagen et al. 2005). This species is a permanent resident in North Dakota and typically resides near large bodies of open water such as lakes, marshes, and rivers with adequate prey and tall trees for nesting and roosting. Bald eagles breed and over-winter in the Dakotas primarily along the Missouri River and other large rivers. Bald eagles have been documented to nest in North Dakota in western Burleigh and southern McLean Counties, along the Missouri River (Gomes no date). For breeding, they build large nests in tall trees or other sturdy structures, and are most often found in forested habitats close to water (Gomes no date). While bald eagles have been observed near the Project Area, they are unlikely to be nesting on or near the Project Area due to the lack of suitable trees in close proximity to large waterbodies.

State-listed species observed during Fall 2009 avian surveys or as incidental observations included 10 Level I and 7 Level II Species of Conservation Priority (Tetra Tech 2010a - Appendix D). Of these state-listed species, Franklin's gull (*Leucocephalus pipixcan*), black tern (*Chlidonias niger*), American white pelican, canvasback (*Aythya valisineria*), northern pintail (*Anas acuta*), northern harrier, Swainson's hawk, ferruginous hawk (*Buteo regalis*), and prairie falcon (*Falco mexicanus*) were observed flying at the height of the anticipated RSA. However, most had very low encounter rates, mostly due to the low overall numbers observed.

State-listed species observed during Spring 2010 avian surveys or as incidental observations included 14 Level I and 10 Level II Species of Conservation Priority (Tetra Tech 2010e - Appendix D). All of these species had low encounter rates, primarily due to their low occurrence within the Project Area.

Finally, most native migratory birds are protected under the MBTA of 1918, and Executive Order 13186 regarding migratory birds applies to activities carried out directly by the TVA.

Gray Wolf

Gray wolves became nearly extinct in the conterminous United States in the early part of the twentieth century. By December 2006, recovery programs had established 1,243 wolves in the Yellowstone area and the northern Rocky Mountains of Montana, Idaho, and Wyoming. The wolf's comeback nationwide is due to its listing under the ESA, resulting in increased scientific research and protection from unregulated killing, along with reintroduction and management programs and education efforts that increased public understanding of wolf biology and behavior. The Project is located in the gray wolf's historic range; however, the current range is far to the north in the northeast corner of the state and Canada, and the Project does not fall within the boundaries of any recovery programs. Once common in forested habitats throughout North Dakota, the last confirmed occurrence in the state was in 2005 in the north-central portion of the state. According to the USFWS North Dakota Field Office website, individual wolves observed in North Dakota are likely transient individuals from Minnesota and Manitoba.

Dakota Skipper

Native prairie serves as vital habitat for the Dakota skipper, a federal candidate species. The Dakota skipper is classified as a candidate species because, although its historic range once consisted of vast unbroken native prairies in north-central United States and south-

central Canada, its current range is now limited to scattered remnants of high quality native prairies in Minnesota, North and South Dakota, and southern Manitoba (USFWS 2002b). The Dakota skipper population has declined due to sensitivity to disturbances, such as grazing and fire, and the loss of native prairie habitat. The USFWS has indicated that the Dakota skipper has not been reported from McIntosh County (http://www.fws.gov/northdakotafieldoffice/county_list.htm); the Dakota skipper has been recorded in 16 counties in North Dakota, the closest being Stutsman County (approximately 30 mi north from its nearest point to McIntosh County). Nonetheless, CPV performed a native prairie survey during which potential Dakota skipper habitat was classified (Tetra Tech 2010); see Appendix C for details and results.

3.4. Cultural Resources

Cultural resources include archaeological sites, standing structures, objects, districts, traditional tribal properties, and other properties that illustrate important aspects of prehistory or history or have important and long-standing cultural associations with established communities or social groups. The Developer conducted a Class I cultural resources survey, a Class II historic architectural reconnaissance survey, and a Class III archaeological survey to identify possible Project effects on archaeological sites and historic architectural resources that are potentially eligible for listing in the National Register of Historic Places (NRHP) and/or State Historic Sites Register (Tetra Tech 2010d, 2010g, 2010h). The Class I survey included review of previously recorded cultural resources and identification of cultural contexts that might aid evaluation of significant cultural resources (Tetra Tech 2010d). The Class II historic architectural reconnaissance survey (Tetra Tech 2010g) and Class III archaeological survey (Tetra Tech 2010h) were conducted to identify if cultural resources were present within the area of potential effect (APE) for archaeology (Figure 3-4, i.e., areas of proposed ground disturbance from Project construction, operation and decommissioning for archaeological sites) and the APE for architecture (Figure 3-4, i.e., area within one-half mi of turbines). These studies were conducted in anticipation of TVA's consultation with SHPO and interested federally recognized tribes.

Local and regional studies consulted during research during the Class I survey indicated that Native Americans might have occupied the Project Area over the last 12,000 years (Gregg et al. 2008). Ethnohistoric accounts suggest that the area of McIntosh County was occupied during the eighteenth and nineteenth centuries by shifting Native American populations of Cheyenne, Lakota, Dakota, Yankton and Yanktonai (Schneider 2002). SHPO's North Dakota Cultural Resource Survey (NDCRS) site files indicate that Native American archaeological sites in McIntosh County commonly included cultural material scatters and stone circles, often found on hills and ridges. Local histories also stated that Native American archaeological sites were common near lakes and streams (Wishek 1941:41-42). Many archaeological sites with stone circles and/or rock cairns might have been disturbed during historic period field clearing and plowing. NDCRS site files included only one prehistoric archaeological site within the Project Area, but outside the APE for archaeology.

The first Euro-Americans moved to McIntosh County in 1884, and settlement progressed rapidly over the following 25 years (Wishek 1941). Most settlers were Russian immigrants of German heritage. Research questions about pioneer settlements, ethnicity and changing rural society and economy are important local and regional cultural contexts. Historic period archaeological sites might be indicated by mapped historic structures. A 1911 atlas indicates that the Project Area contained one mapped cemetery, one church, one school,

and 38 undifferentiated structures (probably both dwellings and agricultural outbuildings) (Ogle 1911). Many of these mapped structures were abandoned or demolished and may be associated with archaeological sites. No properties presently listed on the NRHP are located within five mi of the Project Area.

A Class II historic architectural reconnaissance survey recorded 17 properties with structures within 0.5 mi of Project turbines. Of these, one property contained modern structures and 16 properties were style-dated to 45 years old or greater, including 10 farmsteads (five with at least the main house abandoned), two abandoned schools, two cemeteries, one individual house with no visible evidence of outbuildings, and three outbuildings thought to come from two abandoned farmsteads. Although more than 45-years-old or older, these sites were not found to meet the criteria to be potentially eligible to the NRHP and thus do not meet the NRHP definition of a historic property.

A Class III archaeological survey was conducted during June and July 2010. Archaeological field investigations included a pedestrian survey of the APE for archaeology supplemented by some shovel tests at areas of proposed turbine construction and other selected facilities. Four new archaeological sites were identified within or near the APE for archaeology, including the historic Bethany #1 Cemetery (Site 1 or 32MT259), two possible prehistoric stone circle sites (Sites 2 and 4, or 32MT260 and 32MT262, respectively), and a possible prehistoric stone cache feature (Site 3 or 32MT261). The Site 1 cemetery contains marked and possibly unmarked graves, all of which are protected by the North Dakota Century Code, Chapter 23-06-27 and Chapter 40-02-03. No prehistoric or historic period artifacts were observed during the pedestrian survey or from any of the 179 shovel tests that were excavated. Many additional rock piles resulting from agricultural field clearing were observed within and near the APE, however these field rock piles do not meet the criteria for definition as archaeological sites (Tetra Tech 2010h).

Pursuant to 36 CFR §§§ 800.2(c)(2)(ii), 800.3(f)(2), and 800.4(a)(4)(b), TVA is consulting with the following federally recognized tribes regarding properties within the proposed Project's APE that may be of religious and/or cultural significance to:

- Cheyenne River Sioux Tribes
- Crow Creek Sioux Tribe
- Fort Peck Assiniboine and Sioux Tribes
- Lower Brule Sioux Tribe
- Oglala Sioux Tribe
- Rosebud Sioux Tribe
- Santee Sioux Tribe of Nebraska
- Standing Rock Sioux Tribe

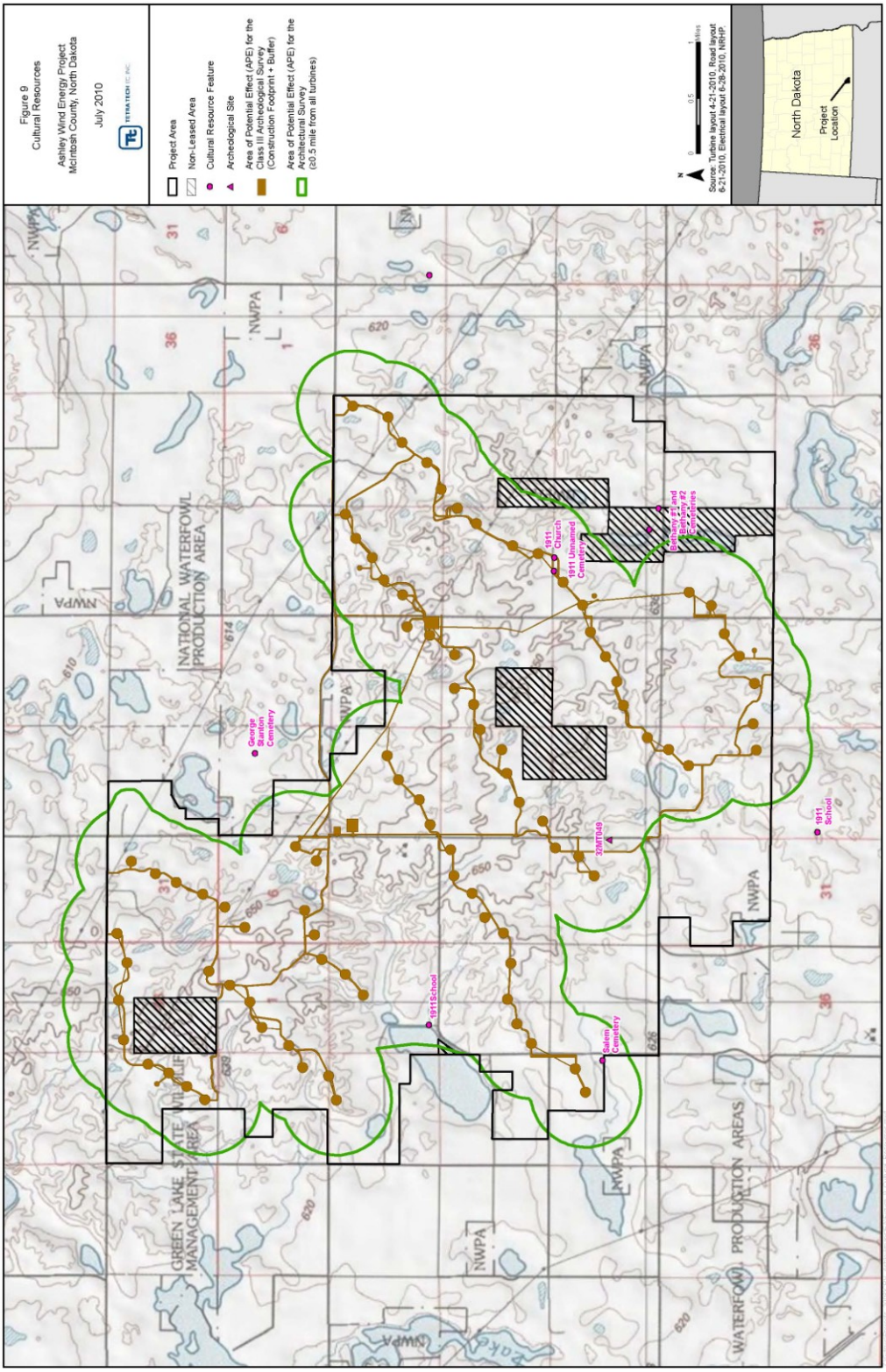

Figure 3-4. Cultural Resources

3.5. Land Use

Based on review of available databases, aerial photographs, and site visits, the current land use within the Project Area consists primarily of undeveloped grassland/herbaceous vegetation and agricultural production (Figure 3-5). Agricultural lands are used for pasture and cultivated crops, mainly wheat, soybeans, sunflowers, and corn. The Project is located within the rural, unincorporated portion of McIntosh County outside of city limits. There are no known military installations in the area. There is no zoning ordinance for McIntosh County, and therefore, no local wind development or other regulations apply to the Project (see Appendix G). As discussed for the visual analyses (Section 4.7) There are potentially 15 occupied properties in the vicinity of the project.

CPV is unaware of existing or planned industrial development in the vicinity of the Project. The nearest existing wind energy facilities are Tatanka Wind Farm and North Dakota Wind II, which are located approximately 19 mi to the southeast and 20 mi to the northeast, respectively. Rough Rider I is a permitted wind project located in Dickey County approximately 19 mi to the east, but it has not yet been constructed. A fourth project, Merricourt, is currently in development approximately 12 mi to the east, near the border between McIntosh and Dickey Counties and has a develop and transfer commercial agreement with Xcel Energy (Xcel 2010). Lastly, a fifth project, JustWind's Logan County Wind Farm, is permitted with a signed PPA and is located about 24 mi northwest of the Project in Logan County (JustWind 2010).Existing and proposed wind energy projects in the vicinity are discussed in more detail in Chapter 4.0.

The USFWS has been purchasing grassland easements in the Prairie Pothole Region for the last 20 years. Native grasslands provide habitat for a multitude of species, and these easements allow for their perpetual protection. There are 169 acres of USFWS grassland easements within the Project Area, located within the southern portion of the Project Area (Figure 3-5).

The Farm Services Agency (FSA) administers the CRP to protect soil and water resources, with the NRCS providing technical land eligibility determinations, conservation planning, and practice implementation. CRP lands are removed from agricultural production and preserved under contract with landowners, typically for 10-year intervals.

3.6. Recreational Resources

Recreational opportunities in McIntosh County include fishing, hunting, wildlife/bird observation, boating, skiing, and camping (Ruff 2009; City of Ashley 2009). Local recreational facilities near the Project Area include the Ashley and Wishek nine-hole public golf course, as well as two city parks in Ashley (Dakota Heartland Champion Community 2009; City of Ashley 2009).

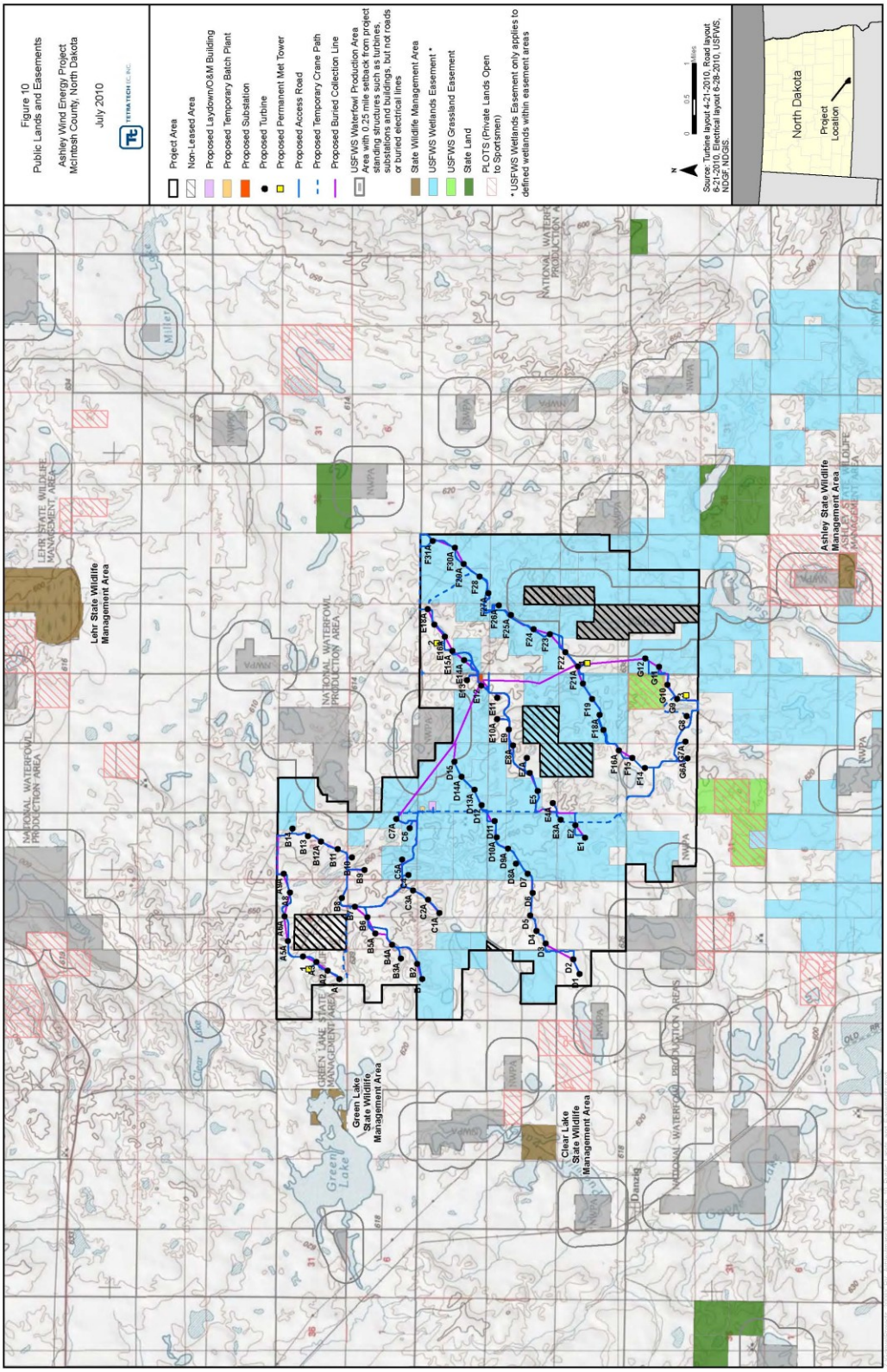

Figure 3-5. Public Lands and Easements

There is one North Dakota State Recreation Area in McIntosh County, the Doyle Memorial State Recreation Area located 2.5 mi west of the Project Area. In addition, eight state Wildlife Management Area (WMAs) are located within McIntosh County, four of which are within 5 mi of the Project Area, as shown on Figure 3-5 (Green Lake WMA, Clear Lake WMA, Ashley WMA, and Lehr WMA). The closest WMA is Green Lake WMA, located approximately 1 mi west of the Project Area. WMAs are open to a variety of public uses, including but not limited to hunting, fishing and trapping (NDGIS 2009). There are also several parcels of land enrolled in the North Dakota Private Lands Open to Sportsmen (PLOTS) program, which provide public access to private lands for hunting. One quarter section of PLOTS is located within the Project Area, near its southern boundary (NDGFD 2010).

There are no National Park Service (NPS) lands within McIntosh County or neighboring counties, with the closest site being Knife River Indian Villages National Historic Site, approximately 120 mi from the Project Area. The Project Area is adjacent to multiple USFWS WPAs, including one WPA (Geisler WPA) present as an inholding of non-leased land within the Project Area boundary (NDGIS 2009). WPAs are part of the National Wildlife Refuge System and preserve wetlands and grasslands critical to waterfowl and other wildlife. WPAs are open to a variety of public uses, including hunting, trapping, fishing, and wildlife observation and photography.

3.7. Visual Resources

The visual setting of the Project Area is a rural rolling landscape with farming, grazing, and some residential development (Figure 3-6). Existing features in the viewshed for the Project Area include linear features of highways and county roads, overhead electrical transmission lines (Figure 2-1), homesteads, communications towers, and fencing. The APE for historic architectural resources survey described in Chapter 3.4 and shown on Figure 3-4 will assess visual effects to potentially NRHP-eligible cultural properties in consultations with SHPO and other consulting parties.

In addition to the existing visual and aesthetic setting associated with the Project Area, the Developer considered the potential visual effects of shadow flicker which can be associated with wind energy projects. A wind turbine's rotating blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomenon to people at nearby occupied residences or public gathering places. The results of Shadow Flicker Impact Analysis are presented in Chapter 4.7 and described in detail in the Shadow Flicker Impact Analysis report provided in Appendix H.

3.8. Noise

McIntosh County would generally be characterized as agricultural and rural, and existing ambient sound levels are expected to be relatively low, although sound levels can be sporadically elevated in localized areas during periods of human activity. Background sound levels would vary both spatially and temporally depending on proximity to area sound sources and naturally occurring sounds. Principal contributors to the existing acoustic environment likely include motor vehicle traffic, mobile farming equipment, farming activities such as plowing and irrigation, all-terrain vehicles, local roadways, rail movements, periodic aircraft flyovers, and natural sounds such as birds, insects, and leaf or vegetation rustle during elevated wind conditions in areas with established tree stands or established crops.

Diurnal effects result in sound levels that are typically quieter during the night than during the daytime, except during periods when evening and nighttime insect sound dominate.

In areas with elevated background sound levels, sound may be obscured through a mechanism referred to as acoustic masking. Seasonal effects such as cricket chirping, certain farming activities, as well as wind-generated ambient noise as airflow interacts with foliage and cropland, contribute to this masking effect. The latter is most prevalent in rural and suburban areas with established tree stands. Wintertime defoliate conditions typically have lower background sound levels due to lower wind masking effects and reduced outdoor activities in colder climates. During colder seasons, people typically exhibit lower sensitivities to outdoor sound levels, particularly in this geographical region of the United States, as windows are closed, further enhancing outdoor to indoor transmission losses, and limited time is spent outdoors as compared to more temperate climates. The environmental noise guideline limits identified in the Acoustic Assessment are absolute and independent of the existing acoustic environment; therefore, a baseline sound survey was not required to assess conformity. The analysis results are provided in the Acoustic Assessment found in Appendix I and Chapter 4.8 of this document.

3.9. Air Quality and Climate Change

The USEPA and the NDDOH regulate air quality in North Dakota through implementation of the Federal Clean Air Act (CAA), 42 United States Code (U.S.C.) § 7401 et seq. The CAA is a federal air quality law, which is intended to protect human health and the environment by reducing emissions of specified pollutants at their source.

The CAA requires the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from the effects of air pollution. The CAA defines NAAQS as levels of pollutant above which detrimental effects on human health and welfare could occur. Standards have been established by EPA for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3) particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and lead (Pb), which are known as the criteria pollutants. PM_{10} and $PM_{2.5}$ particles are those particles in smoke less than 10 microns and 2.5 microns in size, respectively. These particles are too small to be filtered out by the human respiratory system. These small particulates can cause respiratory problems, especially to smoke sensitive portions of the population.

A state or region is given the status of “attainment” if the NAAQS thresholds have not been exceeded for any criteria pollutant, or “nonattainment” for a specific pollutant if the NAAQS thresholds have been exceeded for that pollutant.

North Dakota’s Ambient Air Quality Standards (AAQS) are codified in North Dakota Administrative Code (NDAC) Chapter 33-15-02-04. The North Dakota AAQS are identical to the NAAQS except for hydrogen sulfide (H_2S), PM of 10 microns or less (PM_{10}), PM of 2.5 microns or less ($PM_{2.5}$), and SO_2. There are no NAAQS for H_2S, only state regulations. USEPA recently modified the NAAQS for PM by eliminating the annual standard for PM_{10}, keeping the 24-hour standard for PM_{10}, and modifying the standards for $PM_{2.5}$. The applicable AAQS must be maintained throughout construction and operation of the wind project.

Figure 3-6. Photos of Typical Landscape

The CAA also outlines three types of airshed classification areas under the Prevention of Significant Deterioration (PSD) Program: Class I, II, and III. Class I areas include wilderness areas designated as of August 7, 1977 that are 5,000 acres or greater in size, and also include all National Parks over 6,000 acres. These areas have the most stringent degree of protection from current and future air quality degradation (USEPA 2010). The entire Project Area and region within 300 km of the Project Area is designated as Class II. The nearest Class I area is Theodore Roosevelt National Park, approximately 195 mi (314 km) west-northwest of the Project Area. The NPS has identified the following air quality related values (AQRVs) at this Class I area, which are defined as resources identified by the Federal Land Manager that may be adversely affected by a change in air quality: aquatic resources, fauna, night skies, soils, vegetation, and visibility (NPS 2010).

3.9.1. Existing Conditions

The entire state of North Dakota is in attainment of the NAAQS for all criteria pollutants, and in attainment of the state AAQS for H_2S, PM_{10}, $PM_{2.5}$, and SO_2 (NDDOH 2008). 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 the NAAQS or state AAQS.

3.9.2. Climate Change

On December 15, 2009, the USEPA published a final rule in the Federal Register, finding that elevated concentrations of greenhouse gases (GHG) in the atmosphere "may reasonably be anticipated to endanger the public health and to endanger the public welfare of current and future generations" under section 202(a) of the Clean Air Act (USEPA 2009). This finding was made for six specific GHG that are "directly-emitted, long-lived, and well-mixed" in the atmosphere: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6).

These six specific GHG are considered by USEPA to be the primary cause of human-induced climate change, which they induce by trapping heat radiation that would otherwise escape from the atmosphere into space. These GHG are both naturally-occurring and a direct product of various human activities. They are considered "long-lived" because they persist in the atmosphere long enough to become globally well mixed, meaning that local emissions of GHG cannot be said to affect only the geographic region in which they are generated.

These six GHG are estimated to account for up to 75 percent of the human-induced warming of the atmosphere that has been observed in the last 100 years, with CO_2 being the most significant contributor, although they are collectively only a small fraction of total GHGs. The global atmospheric concentration of CO_2 as of 2009 has increased by about 38 percent from pre-industrial levels as of 2009, and the portion contributed by human activities is primarily due to the combustion of fossil fuels. USEPA expects that without substantial efforts to reduce emissions of these GHG, global atmospheric concentrations would continue to rise, with impacts on the climate that could persist on time scales ranging from decades to centuries.

However, projected regional effects of climate change are not expected to be significant during the period of the 20-year PPA between CPV and TVA. While direct effects of climate

change predicted for the region are not expected to impact the viability of the Project (IPCC 2007), it is speculative whether indirect regional effects could conceivably affect the viability of the infrastructure required to support the Project.

3.10. Socioeconomics

McIntosh County encompasses 975.19 sq mi and is located in southern North Dakota, on the border with South Dakota. In 2000, the U.S. Census Bureau reported that McIntosh County had 3.5 persons per sq mi and a population of 3,390. The U.S. Census Bureau estimate for the 2008 McIntosh County population was 2,639, which is a 22.2 percent reduction in the population from 2000. In 2008, the U.S. Census Bureau reported that 98.8 percent of the population was composed of white persons who are not of Hispanic or Latino origin. The remaining 1.2 percent of the population are minorities. As of 2008, the median age in McIntosh County was 51 years. In 2000, approximately 80.6 percent of the population was 18 years and over, 34.2 percent were 65 years and older, and only 4.2 percent were under five years of age (U.S. Census Bureau 2000).

In 2007, the U.S. Census Bureau reported that the median family income for McIntosh County was $32,245, and that 14.3 percent were living below the poverty level. The 2000 U.S. Census Bureau reported that there were 861 single-family, owner-occupied homes that had a median value of $28,100. The homeownership rate in 2000 was 83.1 percent (U.S. Census Bureau 2000).

The labor force in 2000 comprised 1,466 individuals, or 52.1 percent of the population 16 years and older. There were 36 individuals, or 1.3 percent that were unemployed. In 2000, the industry within McIntosh County was comprised of 28.6 percent in educational, health and social services; 21.3 percent in agriculture, forestry, fishing and hunting, and mining; and 10.3 percent in the retail trade. All other industries in McIntosh County account for less than 6.5 percent, with the most substantial industry being finance, insurance, real estate, and rental and leasing at 6.2 percent.

Agriculture is a large part of the economy for McIntosh County. According to the USDA, there were 513 farms in McIntosh County in 2007 that averaged 1,072 acres per farm. The total market value for agricultural products produced was $75,862,000, which averaged $147,880 per farm. Sixty-six percent of agricultural product production came from crops for a total of $49,985,000. The remaining 34 percent, or $25,877,000, came from livestock sales (USDA 2007). Agricultural lands (hay and crop) comprise approximately 40 percent of the Project Area (Table 3-2). Landowners also use their property for pasturing animals.

According to the 2007 Census of Agriculture, the top crop item for McIntosh County is wheat (93,336 acres) followed by forage land for hay, grass silage, and greenchop (57,022 acres) (USDA 2007). Other crops grown in McIntosh County include soybeans, sunflowers, and corn. Cattle were the primary livestock in McIntosh County in 2007. In 2007, McIntosh County had 513 farms comprising 549,685 acres. This is a slight decline from 2002 when McIntosh County had 526 farms comprising 568,544 acres. Crop sales accounted for 66 percent of products sold in 2007, while livestock sales represented 34 percent of products sold (USDA 2007).

Economically important forestry resources are not found in the Project Area. The 2007 Census of Agriculture has no record of any market value for cut Christmas trees and short rotation woody crops in McIntosh County. Generally trees are limited in the Project Area

and are associated with drainages and shelter belts around homesteads, which have limited economic value.

The NRCS mapped soil units (also see Chapter 3.1) within the Project Area include prime farmland and farmlands of statewide or local importance (Figure 3-7). Prime farmland and farmlands of statewide importance are lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Farmlands of statewide importance generally do not produce a yield as high as prime farmland, but can if conditions are favorable and the land is treated and managed according to acceptable farming methods. Prime farmlands in McIntosh County are presented in Table 3-3 below.

Table 3-3. Prime Farmland Soils in McIntosh County

Soil Unit	Prime Farmland	Prime Farmland If Drained	Farmland of Statewide Importance	Area (acres)	Percentage of Project Area (17,385 acres)
Bearden silt loam, 0 to 2 percent slopes	X			15	0.1
Marysland loam		X		52	0.3
Colvin silt loam		X		6	0.0
Williams-Bowbells loams, 0 to 3 percent slopes			X	105	0.6
Arnegard loam, 0 to 6 percent slopes			X	87	0.5
Williams-Bowbells loams, 3 to 6 percent slopes			X	73	0.4
Hamerly loam, 0 to 3 percent slopes			X	22	0.1
Makoti silty clay loam, 0 to 3 percent slopes			X	10	0.1

There is only one prime farmland soil within the Project Area. This soil comprises 15 acres or less than 0.1 percent of the Project Area. There are two soils that are considered prime farmland when drained. These comprise 58 acres or approximately 0.3 percent of the Project Area. Additionally, the Project Area contains 297 acres or approximately 1.7 percent of farmland of statewide importance.

3.11. Transportation

3.11.1. Roads

The existing roadway infrastructure within the Project Area consists of county and township (section line) roads, typically comprised of gravel or packed dirt. No federal or state highways are located within or adjacent to the Project Area. The closest highways include: State Highway 13, which runs east-west through Lehr and Wishek approximately 3 mi north of the Project Area; State Highway 11, which runs east-west through Ashley approximately 6.5 mi south of the Project Area; and State Highway 3, which runs north-south from Wishek, approximately 6.5 mi west of the Project Area.

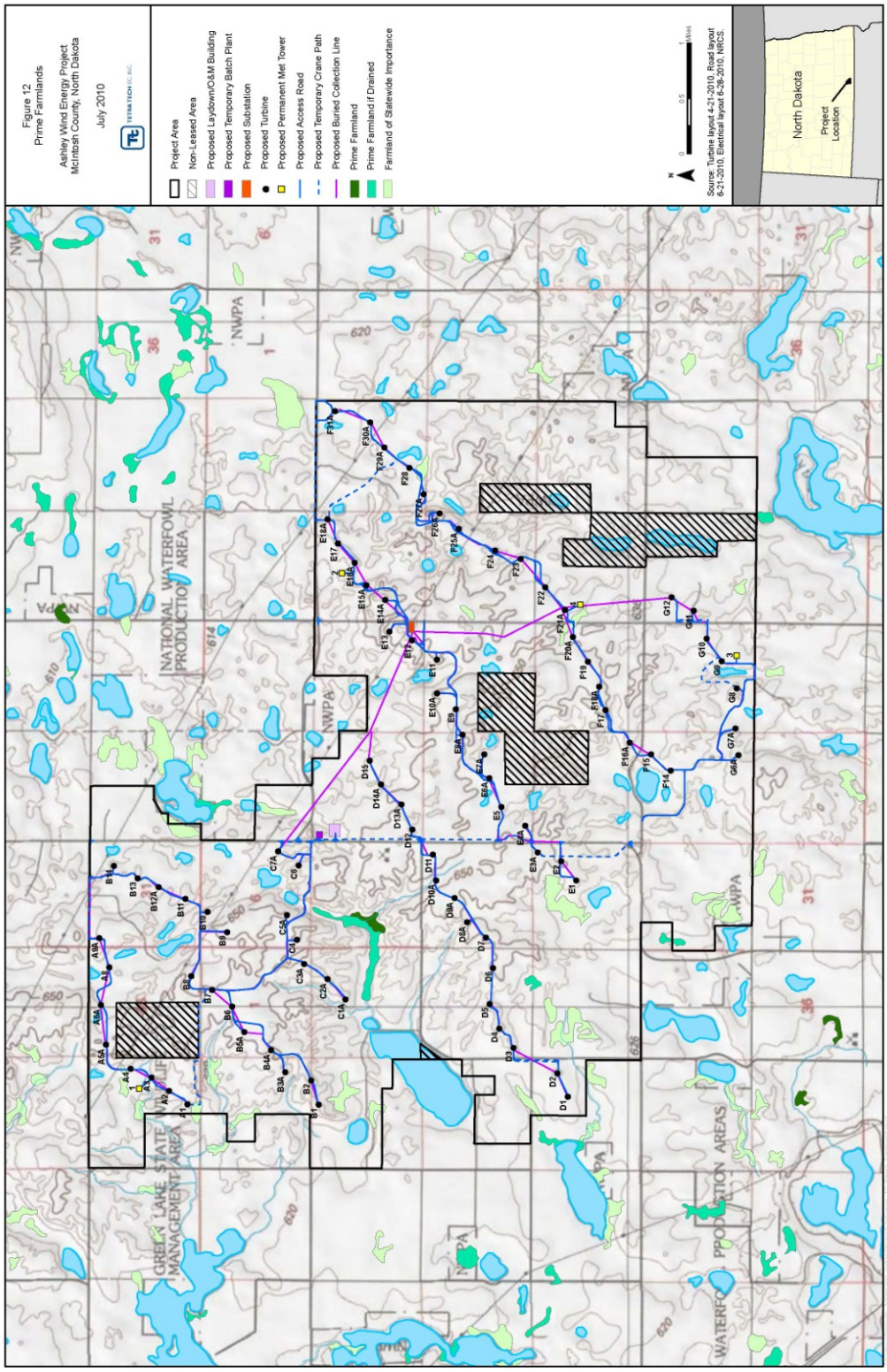

Figure 3-7. Prime Farmlands

3.11.2. Traffic

Existing traffic volumes on the state highways in the vicinity of the Project are presented in Table 3-4 and Figure 3-8. Due to the complexity of determining the specific capacity of any highway, general estimates are used for planning purposes. These estimates include Average Annual Daily Traffic (AADT) and Commercial Truck Traffic counts provided by the NDDOT. For purposes of comparison, the functional capacity of a two-lane paved rural highway is approximately 5,000 vehicles per day. The state highways in the vicinity of the Project Area carry levels of traffic that are fairly typical for rural North Dakota, representing only a fraction of their capacities (NDDOT 2008).

No vehicle count estimates are available for the additional county and township roads that run through the Project Area. However, based on the condition, width, and function of these roads, they are likely to have far lower daily traffic than the nearby state highways.

Table 3-4. Existing Daily Traffic Levels

Roadway Segment	AADT/Commercial Truck Traffic
Highway 13 east of Lehr	370/70
Highway 13 west of Lehr	550/90
Highway 13 east of Wishek	950/95
Highway 11 east of Ashley	440/70
Highway 11 at Ashley	700/130
Highway 11 west of Ashley	460/115
Highway 3 north of Highway 11	260/70
Highway 3 south of Wishek	675/120

Source: NDDOT 2008

3.11.3. Air Traffic

Two general aviation airports are located within seven mi of the Project Area: Wishek Municipal Airport (located six mi to the northwest) and Ashley Municipal Airport (located seven mi to the south) (NDGIS 2009). Wishek Municipal Airport has one 3,450-ft long asphalt runway oriented roughly northwest-southeast at an approximate elevation of 2,038 ft above sea level. Ashley Municipal Airport has one 4,300-ft long asphalt runway oriented northwest-southeast and one 2,825-ft long turf runway oriented east-west. The airport is at an approximate elevation of 2,015 ft above sea level (AirNav 2009a; 2009b). USGS 1:24,000 scale topographic maps also depict two private landing strips (Nietzsche Field and Rau Field) within seven to 10 mi of the Project Area's southern boundary; however, these two landing strips are no longer utilized. The nearest commercial airport in North Dakota is Jamestown Regional Airport located approximately 60 mi northeast of the Project Area (North Dakota Aeronautics Commission 2009; NDGIS 2009).

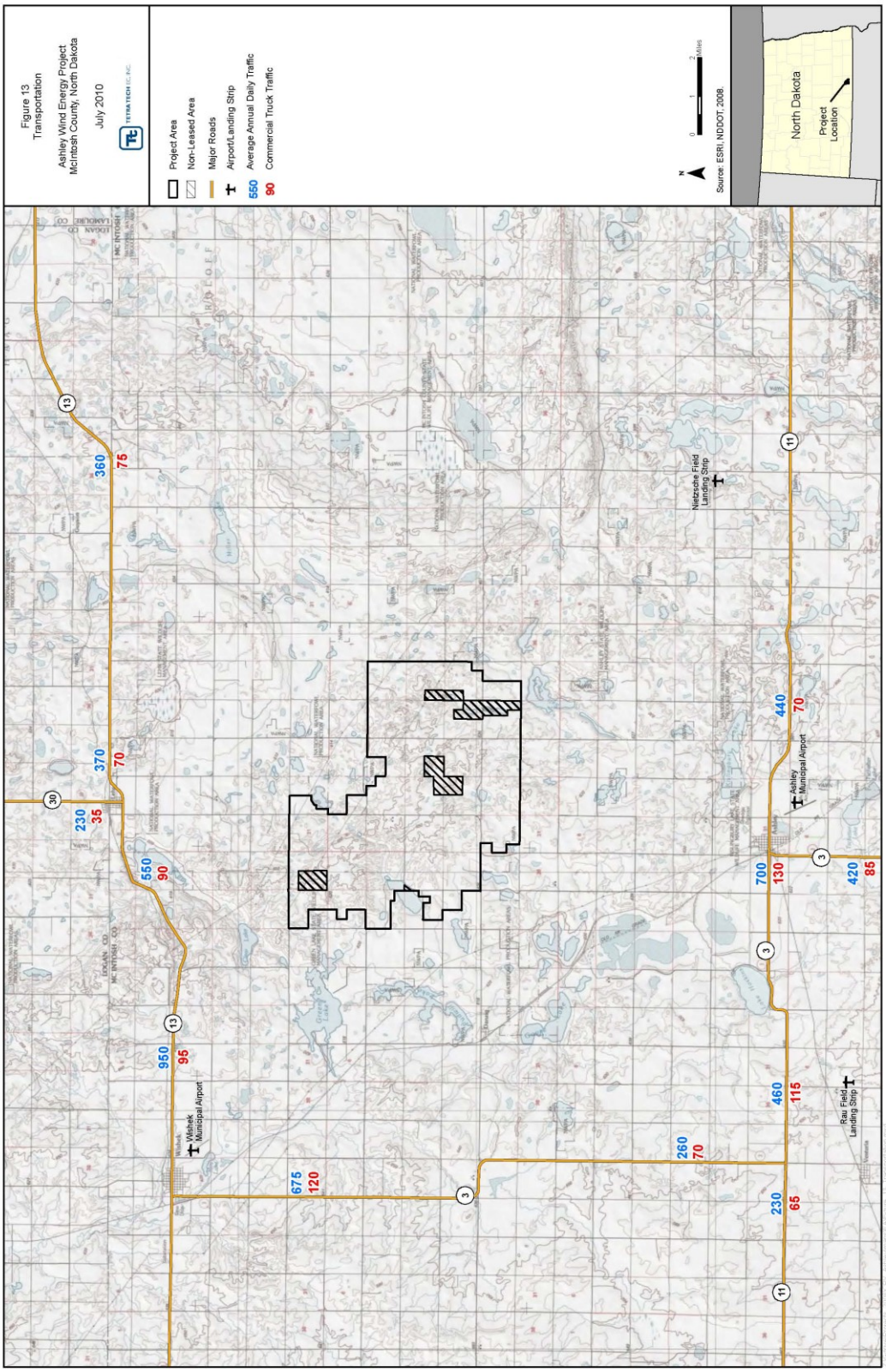

Figure 3-8. Transportation

3.12. Communication Resources

Telecommunications infrastructure and services that could potentially be affected by Project construction or operation include underground telephone and fiber optic cables, amplitude modulation (AM) and frequency modulation (FM) radio broadcasts, off-air television, non-federal government microwaves, and land mobile radio (LMR). The locations of underground communication cables in the Project Area would be identified by the respective utility companies prior to Project construction. Existing telecommunications services have been identified and potential impacts of the proposed construction and operation of the Project were assessed through a review by Comsearch. Infrastructure and services within or near the Project Area include two off-air television stations with very limited programming (KJRE and K59BL), one non-federal government microwave beam path licensed to Basic Electric Power Cooperative that crosses through the center of the Project Area from northwest to southeast (Figure 2-3), and one LMR that is located approximately one mi south of the Project Area. Project planning has explicitly considered these services and sought to minimize impacts in the siting of turbines and other Project components. The telecommunications study conducted by Comsearch is attached as Appendix J.

3.13. Public Safety

3.13.1. Electromagnetic Fields

Every electrical device generates both electric and magnetic fields in its vicinity. These fields, referred to in combination as electromagnetic fields (EMF), arise from voltage, or electrical charges, and current, or the flow of electricity, associated with electrical systems. The intensity of any particular electric field is related to the voltage, while that of the associated magnetic field is related to the current. EMF can be present both outdoors and indoors, associated with large scale structures such as transmission lines, power collection lines, and substation transformers, as well as local household wiring and electrical appliances. The primary sources of existing EMF within the Project Area are likely the two high voltage transmission lines that currently intersect it.

3.13.2. Hazardous Materials / Hazardous Waste

The site is located in a relatively rural area of North Dakota that has not experienced significant industrial activity. CPV has nonetheless investigated the likelihood of environmental contamination from hazardous materials/waste through an Environmental Data Resources, Inc. (EDR) Database Search for Environmental Contaminants dated November 10, 2008. The EDR Database Search consisted of a computerized search of pertinent federal and state databases associated with potential subsurface contamination or hazardous materials within and near the Project Area. The search was performed pursuant to the American Society for Testing and Materials (ASTM) Standard E1527-05 using a database maintained by an independent consultant.

The EDR review did not identify any environmental database records within the Project Area or adjacent search areas. Because production of petroleum products is often regulated differently than storage of petroleum products, oil and gas production facilities are often excluded from the EDR database review. However, information from the NDIC,

Department of Mineral Resources, Oil and Gas Division (2009), indicates that petroleum production facilities are not present within the Project Area.

Since the completion of this review, no large industrial or commercial activities likely to produce hazardous wastes have been conducted within the Project Area. Nevertheless, a Phase I Environmental Site Assessment (ESA) of the Project Area would be performed by the Developer following receipt of required permits and prior to construction to identify and assess thoroughly any recognized environmental conditions (RECs) that may exist.

3.13.3. Security

The Project is located in an area that has a low population density and crime rate (City of Ashley 2009). Impacts on the security and safety of local communities from construction and operation of the Project would be negligible. Access to wind turbine towers would be locked when O&M personnel are not utilizing the towers.

3.14. Public Services

3.14.1. Local Services

The Project is located in a highly rural, lightly populated area in south-central North Dakota. Homesteads and farms within the Project Area, and small towns nearby, are served by an established transportation and utility network. The closest towns to the Project Area are Lehr (4.5 mi to the north), Ashley (six mi to the south), and Wishek (seven mi to the northwest). Wishek has the largest population with 1,122 people, followed by Ashley with 882 people, and Lehr with 114 people (U.S. Census Bureau 2000). The abandoned town of Danzig is also located two mi west of the Project Area.

Ashley is the county seat of McIntosh County. It provides sanitary water, sewer, utilities (e.g., natural gas and electricity) services, solid waste disposal services, educational facilities, and recreational facilities (e.g., a nine-hole golf course, two city parks, and opportunities for fishing, boating, skiing, and camping at nearby Hoskins Lake). Ashley also provides emergency services, including a hospital with two clinics, a full-time police department, a volunteer fire department, a qualified emergency medical technician staff, and a qualified first response team (City of Ashley 2009).

Emergency services within the Project Area are provided out of Lehr, Ashley, and Wishek. The closest ambulance services to the Project Area are in Wishek and Ashley. The Project Area straddles three fire protection districts, including Wishek Fire Protection District in its northwestern portion, Lehr Rural Fire Department in its northeastern portion, and Ashley Rural Fire Department in its central and southern portions (NDGIS 2009).

3.14.2. Electrical Service

Two existing high voltage transmission lines, a MDU 230-kV line and a Basin Electric Power Coop 345-kV line, pass through the Project Area. Two substations are located in Ashley, including one MDU 42-kV substation and one KEM Electric Cooperative, Inc. (KEM) 42-kV substation. One MDU 230-kV substation is located in Wishek. Electrical service is distributed to the Project Area by KEM (2009).

3.14.3. Water Supply

The Project Area is located entirely within an unincorporated, highly rural portion of McIntosh County. Water supply is assumed to be provided primarily from private groundwater wells for construction and operation. Drillers' logs from the North Dakota State Water Commission (NDSWC) indicate the presence of 16 private wells in the Project Area, including 15 stock wells and one domestic well (NDSWC 2009).

3.15. 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.

EO 12898 was signed by President Clinton in 1994 and orders federal agencies to identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States" (USEPA 1994). While TVA is not subject to this EO, it addresses environmental justice impacts as a matter of policy.

A description of the geographic distribution of low-income and minority population groups was based on demographic data from the 2000 Census. According to the guidance (CEQ 1997), low-income populations in an affected area should be identified with poverty thresholds from the Census Bureau. Income data is not available at the block level. The Project Area is located in Block Group 2 of Census Tract 9729; Block Group 2 includes all of McIntosh County except for Ashley and Wishek. According to the 2000 Census, 21.3 percent of this Block Group (270 of 1,269 people) was below the poverty level, compared to 15.4 percent of McIntosh County, 11.9 percent of the state population, and 12.4 percent of the United States population (U.S. Census Bureau 2000).

Minority is defined as individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. The CEQ guidance states that minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. According to the 2000 Census data, the Project Area is within 17 census blocks in Block Group 2, Census Tract 9729. The 17 blocks had a total population of 24 people, and all 24 people considered themselves white, not Hispanic or Latino. The minority population in 2000 in McIntosh County was 1.2 percent, compared to 8.3 percent in the state.

No Native American Reservations, which can represent minority and low-income populations in the region, were identified in McIntosh County or any adjacent counties in North Dakota and South Dakota.

CHAPTER 4

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter provides an assessment of the potential environmental consequences of the Proposed Action and No-Action Alternative. The terms “consequences,” “effects,” and “impacts” are used synonymously in this discussion, and may be either beneficial or detrimental. Per guidance from the CEQ, environmental consequences include:

(a) Direct effects, which are caused by the action and occur at the same time and place.

(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR 1508.8)

In addition to direct and indirect effects, this chapter evaluates cumulative impacts for those resources which may be potentially substantially affected by the Proposed Action. As defined by the CEQ, a cumulative impact is: “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions …” (40 CFR 1508.7).

The geographic area for the cumulative impacts analysis area was determined independent of political boundaries and with consideration of potential Project effects to each of the resources areas under review that could occur beyond the Project Area boundary. For most resources the analysis area for cumulative impacts consisted of an area within 25 mi of the proposed Project Area, including all of McIntosh County, North Dakota, and portions of Emmons, Logan, Lamoure, and Dickey Counties, North Dakota, and Campbell and McPherson Counties, South Dakota. This area was an appropriate spatial scale based for most resources on several factors, including precedent set by comparable projects which have undergone environmental review, as well as the Developer's confidence in identifying existing and reasonably foreseeable future actions within this range. Actions included in the cumulative analysis include existing and reasonably foreseeable future wind energy facilities within the analysis area. Other than wind energy facilities, no other sizable existing or foreseeable industrial projects or other projects with similar resource impacts were identified in this analysis area as contributing to cumulative impacts.

TVA defines “reasonably foreseeable” future wind projects as those that have acquired either or both of the following:

(a) The necessary state and, if applicable, federal permits for construction and operation

(b) A signed PPA, take-off agreement, or other agreement establishing the long-term financial viability of the project.

TVA is aware of five wind energy facilities within the analysis area, including two existing facilities and three reasonably foreseeable future facilities (Figure 4-1). The existing facilities are:

- ACCIONA's Tatanka Wind Farm, a 180 MW project consisting of 120 1.5 MW turbines located approximately 19 mi southeast of the Project in Dickey, McIntosh, and McPherson Counties (Acciona 2010); and

- NextEra's North Dakota Wind I and II (formerly known as Edgeley/Kulm Wind Energy Center), a 61.5 MW project with 41 1.5 MW turbines located approximately 20 mi northeast of the Project in Lamoure County (AWEA 2009).

The reasonably foreseeable future projects include:

- EnXco/Xcel Energy's Merricourt Wind Project, a proposed 150 MW project consisting of 100 1.5 MW turbines with a develop and transfer commercial agreement to be located approximately 12 mi east of the Project at the border of McIntosh and Dickey Counties (Xcel 2010);

- NextEra's Rough Rider I, a permitted project located in Dickey County approximately 19 mi east of the Project, proposed to consist of up to 116 1.5 MW turbines with a total capacity of 175 MW (Wetzel 2009), and

- JustWind's Logan County Wind Farm, a permitted project with a signed PPA located about 24 mi northwest of the Project in Logan County, proposed to consist of approximately 150 2.4 MW turbines with a total capacity of 368 MW (JustWind 2010).

Following the discussion of direct/indirect and cumulative environmental effects, this chapter provides a summary of conclusions regarding the Project's anticipated impacts and conformance with federal regulations. Lastly, it details the mitigation measures to be implemented during construction and operation in order to avoid or minimize those impacts.

4.1. Geology, Topography, and Soils

4.1.1. Proposed Action

Geology and Topography
Impact of the Project on available geologic resources is likely to be limited. Due to the thickness of surficial materials, excavation or blasting of bedrock is extremely unlikely. Some gravel pits have been observed in the Project Area during site visits; however, they are relatively few and minor in size and will be avoided. As noted, review of the available literature has not identified any geologic hazards, such as seismic activity, soil liquefaction, and subsidence, likely to affect the Project.

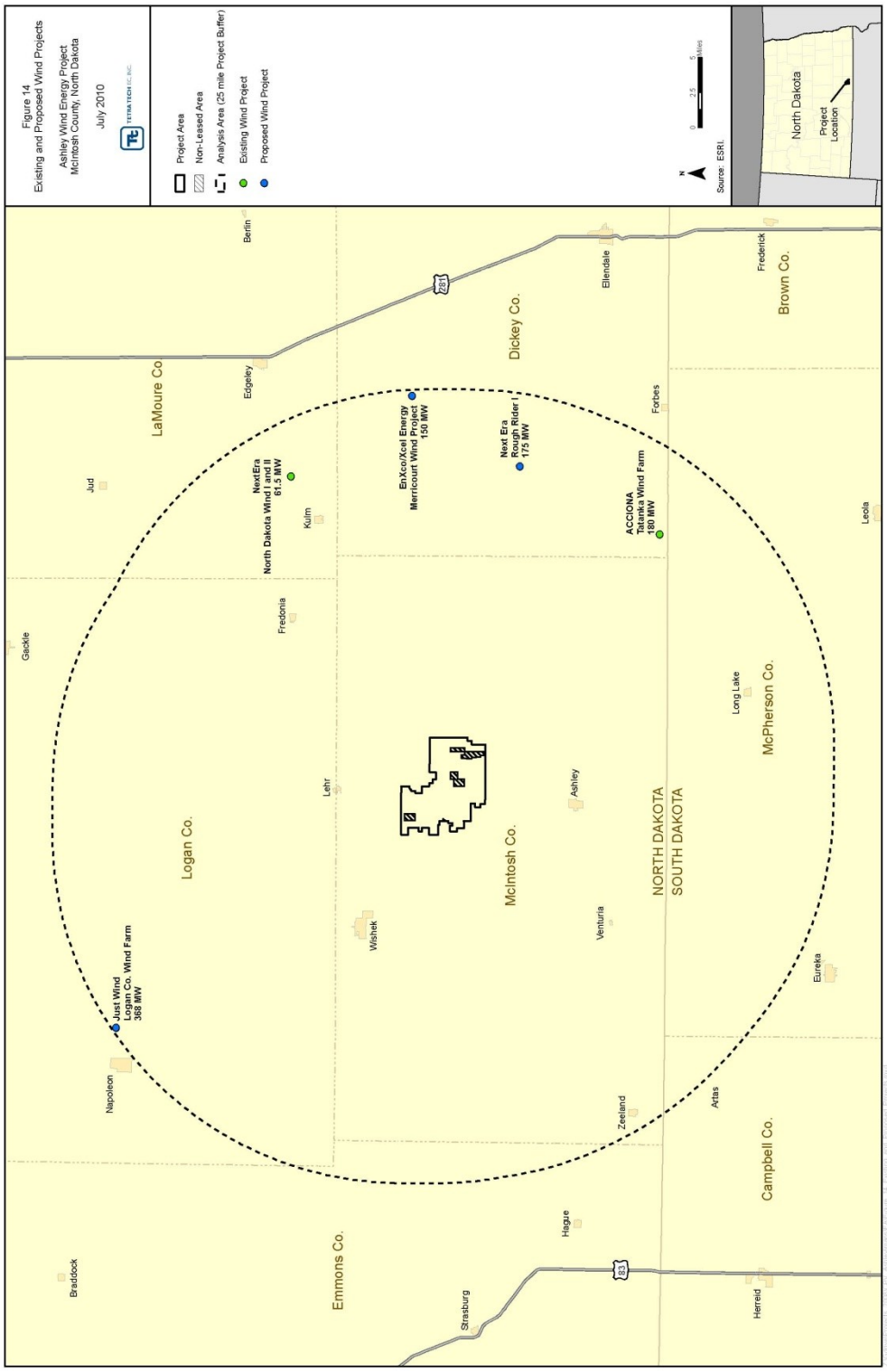

Figure 4-1. Existing and Proposed Wind Projects

Soils

Based on the most conservative Project layout (Figure 2-1), estimated impacts to soils in the Project Area include approximately 476 acres of temporary disturbance during Project construction inclusive of approximately 73 acres of permanent disturbance due to occupancy by Project components (Table 2-1; Figure 3-1). These areas represent 2.9 percent and 0.5 percent of the Project Area, respectively.

During the scoping process, comments were received suggesting the importance of the Project Area for soil conservation. In areas where construction activities would occur, potential impacts to soils could include: mixing of soil and subsoil, soil compaction, and erosion by wind and water. Such impacts are likely to be minimal due to the fact that construction activities would generally be conducted in areas that are not underlain by sensitive or highly productive soils.

Hydric soils, which are particularly susceptible to compaction, comprise a small portion of the temporary construction footprint. Total temporary impacts to soils characterized as “all hydric” are expected to be less than one acre. An additional approximately 325 acres of soils characterized as “partially hydric” are also within the Project footprint; however, the actual extent of hydric soils within these areas is likely to be much less.

Temporary impacts to highly productive agricultural soils would also be very minor. No temporary impact on prime farmland is expected, and impact on farmland of statewide importance would be 0.7 acre, or 0.2 percent of the total farmland of statewide importance within the Project Area.

During the scoping process, surface disturbance, erosion, mass failure, and the associated impacts of such processes on surface waters, wetlands, and aquatic habitats were identified as environmental concerns related to the Project. In consideration of the low to moderate susceptibility of soils in the Project Area to erosion by water, and the fact that turbines would be sited on level terrain, the potential for significant erosion and resulting mass failure driven by stormwater runoff following Project construction is considered low. Approximately 88 percent of the soils within the temporary Project footprint (454 acres) have a moderate to high susceptibility to wind erosion (i.e., USDA Wind Erosion Groups 5 or less). The potential for wind erosion would be greatest during the period following disturbance and prior to reestablishment of vegetation. The effects of wind erosion would depend upon the wind velocity, size and geometry of the disturbed areas, and length of time that the areas are unvegetated.

Permanent impact on soils would primarily consist of removal of areas occupied by Project components from availability for agricultural production. No facilities would be constructed within areas characterized by prime farmland soils. A total of approximately 0.5 acre of farmland of statewide importance would be permanently affected by Project construction, representing approximately 0.16 percent of the total acreage of farmland of statewide importance within the Project Area.

Cumulative Effects

Development of the Project and other existing or reasonably foreseeable future wind energy facilities is expected to have minimal impact on geology, topography, and soils within the analysis area. The Project is anticipated to have very limited effects on geologic resources, and impact on soils, such as removal from potential agricultural production, compaction, erosion, and mass failure, are also expected to be limited. In light of these minor

incremental effects and the overall size of the cumulative impact analysis area with respect to the total area of land currently developed or proposed to be developed for wind energy generation, the cumulative effects to geology, topography, and soils are not expected to be significant.

4.1.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, impacts to geology, topography, and soils associated with construction and operation of the proposed Project would not occur. These resources would be expected to persist within the Project Area in their existing state, as described in Chapter 3.0.

Cumulative Effects
As noted, the No Action Alternative would have no direct or indirect effects on geology, topography, and soils. Consequently, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no cumulative effects to these resources would occur.

4.2. Water Resources

4.2.1. Proposed Action

Surface Waters and Floodplains
Streams nearest the Project include the South Branch of Beaver Creek, approximately 12 mi to the west, and Spring Creek approximately 18 mi to the south. Surface waters in the Project Area are limited to lakes and prairie potholes as no streams were identified during the wetlands delineation of the Project Area study corridor (Figure 3-2; also see Appendix B). All mapped “blue lines” on the USGS NHD (USGS 2010) and the NWI were examined during the wetlands delineation of the Project study corridor. Upon examination in the field, areas marked as blue lines intersecting the Project study corridor lacked bed, bank and channel features and would not qualify as a “waters of the U.S.” under the definitions provided by the USACE.

Project facilities would be designed to avoid impacts on surface water resources to the extent practicable. Wind turbines would be built in uplands to avoid surface water resources in the lower elevations to the extent practicable. However, Project facilities, such as underground electrical collector lines, access roads, turbine pads, and the O&M building, would impact land and, therefore, potentially impact surface water runoff within the Project Area. Construction and operation of the Project may affect surface waters in the Project Area and vicinity, either directly through alteration of the surface water body bed or banks, or indirectly through vegetation clearing, increased siltation and sedimentation. Construction near a surface water could introduce pollutants (e.g., sediments, chemicals), causing changes in water quality. The Developer has committed to using best management practices (BMPs) and implementing mitigation measures that will be outlined in its SWPPP and Spill Prevention, Control, and Countermeasure (SPCC) Plan to avoid, minimize and mitigate for potential impacts to surface waters affected by the Project. These plans would be developed as part of the NDPDES permit process closer to Project construction. With implementation of these features and measures described, effects to surface waters would be minor.

Typical mitigative measures and BMPs that may be used during construction and operation of the Project include protecting topsoil, minimizing soil erosion and protecting adjacent water resources from direct and indirect impacts through practices such as containing excavated material, use of silt fences and slope breakers or similarly protective flow diversion and attenuation devices, protecting exposed soil, preserving existing vegetation when practicable, stabilizing restored material, and re-vegetating disturbed areas with native species, as recommended by the USEPA (Appendix A). The effectiveness of these best management practices would be monitored and documented as specified in the SWPPP and other documents, typically by an environmental inspector, on a routine basis. With these practices in place, impacts on water resources are expected to be minimal.

The North Dakota State Water Commission reports that no identified floodplains are located in the Project Area (Appendix A). The Project would be designed to avoid flood-prone areas, wetlands and waterbodies to the extent practicable. Therefore, it is unlikely that the Project would impact floodplain resources and would, therefore, comply with the requirements of EO 11988 Floodplain Management.

Wetlands

Eighty-two wetlands were identified in the Project study corridor; these were identified as palustrine emergent (79 wetlands), palustrine scrub-shrub (1 wetland) and palustrine forested (2 wetlands) wetlands following Cowardin et al. (1979). Fens, a type of peat-forming wetland having alkaline waters, were absent from the Project. Wetlands within the surveyed corridor ranged in size from less than 0.01 acre to 1.98 acres. All 82 wetlands appeared to be isolated features lacking a hydrologic connection or significant nexus to a "water of the United States (U.S.)" (see Appendix B). 3-2 shows the distribution of wetlands crossed by the Project.

The Project has been carefully designed to avoid and minimize impacts on wetlands and waters of the U.S. to the extent practicable. The finalized turbine layout takes advantage of higher elevations and avoids low-lying areas, which are more likely to contain wetland areas. By avoiding to the extent practicable and minimizing impacts on wetlands through design and use of protective measures during construction, the Project would have only minor effects and be consistent with EO 11990.

North Dakota has been granted authority in Section 404 permit decisions through State Water Quality Certifications (CWA, Section 401). Under the 401 Certification, the NDDOH has prohibited work that would have impacts on classified waters (i.e., certain lakes) under the USACE Nationwide Permit 12 (NDDOH 2007). No classified waters would be affected by the construction or operation of the Project.

Currently, wetland mitigation is not planned specifically to offset impacts on wetlands, however, Chapter 4.3 references voluntary measures under discussion as part of the Section 7 consultation between the Developer, TVA, and USFWS which would beneficially affect wetlands through proposed conservation easements and/or land acquisitions for whooping crane habitat. Should wetland mitigation become necessary, the selection of any potential wetland mitigation site(s) would be based on FAA guidelines so that wildlife would not be attracted to areas near airports (Appendix A).

Groundwater

Impact on groundwater resources within the Project Area is anticipated to be minimal. O&M water requirements likely would be satisfied with a single domestic-sized water well.

Based on the small amount of increased impervious surface area that would be created by Project components relative to the separation of these components and the size of the entire Project Area, the Project would likely have minimal impact on regional groundwater recharge. In isolated areas where the groundwater table is locally elevated, Project construction activities such as excavation and construction of foundations may encounter groundwater. The construction of turbine foundations may therefore affect shallow groundwater flow patterns; however, such impacts would likely be minor and highly localized, with the groundwater resuming its normal course of flow downgradient of the foundation.

If dewatering of excavations is necessary, water would be discharged to the surrounding surface, allowing it to infiltrate back into the ground to minimize potential impact. In addition, each turbine would be located a minimal distance of 1,400 ft from existing occupied residences, thereby minimizing the risk of impact on private wells in the area. The nearest wells to turbines are approximately 223, 691, and 783 ft, the balance of wells in the Project Area are greater than 1,000 ft from turbines. A review of the well driller's report for the closest well (an active well for cattle) confirmed the well is cased, grouted, and 50 ft deep; therefore no adverse impacts are anticipated from construction of the 7-10 ft deep turbine foundation at a distance of 223 ft away. Construction of the turbine foundations is not likely to require subsurface blasting; therefore, disturbances to groundwater flow from newly fractured bedrock are not anticipated. In the event that subsurface blasting is required (unlikely), a blasting plan would be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction. Groundwater quality and quantity is not anticipated to change as a result of construction or operation of the Project. Groundwater resources in the area are entirely sufficient to support withdrawals needed for the Project without detrimentally affecting other groundwater users in the area.

Cumulative Effects
Cumulative impacts on water resources are expected to be minimal. No adverse impacts on water resources from the Project are anticipated as the Developer has avoided to the extent practicable or has mitigated permanent wetland impacts with careful Project layout design. Floodplains do not occur in the Project Area and potential impact on ground and surface water from construction would be avoided or mitigated through adherence to NDPDES permit requirements and BMPs as discussed in Section 2.1.2 and Chapter 5. By avoiding to the extent practicable and minimizing impacts on wetlands through design and use of protective measures during construction, the Project would have only minor incremental effects. No other incremental cumulative effects to water resources from the Proposed Action are anticipated.

4.2.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, impacts to water resources, including surface waters and floodplains, wetlands and groundwater, associated with construction and operation of the proposed Project would not occur. These resources would be expected to persist within the Project Area in their existing state (Chapter 3.2).

Cumulative Effects
As noted, the No Action Alternative would have no direct or indirect effects on water resources. Consequently, no incremental effects from the Project would be added to past,

present, or reasonably foreseeable future actions, and no cumulative effects to these resources would occur.

4.3. Biological Resources

4.3.1. Proposed Action

Vegetation
The Proposed Action would result in both temporary and permanent impact on vegetation including native and non-native grasslands, primarily associated with clearing, grading, and other construction activities. Temporary disturbance and removal of vegetation would have the greatest impact as shown in Table 4-1. The operational footprint would result in an estimated loss of 45 acres of native vegetation (native prairie and tame grassland) with the most conservative turbine layout (Figure 2-1). An estimated 277 acres of native grasslands would be affected during construction using the 87-turbine layout. In areas where disturbance is significant and natural regeneration of onsite plant propagules would not occur, the temporary loss of habitat will be mitigated by reseeding of the affected areas with native prairie plant species. The operational footprint would result in an estimated loss of up to 36 acres of native prairie (Table 4-1; Figure 3-3). The spread of noxious weeds during construction is an additional potential impact. Develop a management plan to prevent the spread of noxious weeds throughout the Project or adjacent areas during construction and ongoing operations, in accordance with state and county regulations.

The extent of permanent vegetation loss associated with the Proposed Action has been minimized to the extent practicable in project design and is relatively small in relation to the Project Area. The degree of impact to vegetation including native and non-native grasslands would be minor.

Table 4-1. Estimated Construction and Operation Footprint on Vegetative Cover

Cover Type	Construction Footprint (acres)	Operation Footprint (acres)
Crop	110	16
Crop and Hay	73	10
Hay	16	2
Native Prairie	223	36
Tame Grassland	54	9
Other	0	0
Total*	**476**	**73**

* Total impact calculations use the 87-turbine Project layout (Figure 2-1). In comparison, the 80-turbine Project layout would have a minimum footprint of least 433 acres for construction inclusive of approximately 67 acres for operation.

Another direct impact to vegetation would be the removal of land from the CRP program. The Developer would work with landowners to compensate the FSA for any land removed from CRP as a part of the Project footprint, as allowed by law.

Wildlife
Similar to past development in the Project Area, while the Proposed Action has minimized its footprint, there would be an incremental loss of native habitats due to Project implementation. Activities such as road construction can destroy or disrupt wildlife habitat;

displaced wildlife would likely relocate to nearby unaffected areas within the Project Area if such areas are not already at carrying capacity.

Several bird species exhibited high encounter rates during Fall 2009 surveys (i.e., frequently observed flying at the height of proposed turbines), suggesting the potential for direct impact on these species from turbine collisions. Snow goose and Canada goose mortality has been documented at other wind energy facilities, but the overall numbers of fatalities are very low (Erickson et al. 2004; Anderson et al. 2005; Jain et al. 2007). The combination of the high encounter rate and prior evidence of negative turbine interactions suggest that some fatalities of these species of geese could occur at the Project. If fatalities do occur, they are not expected to have population-level impact as local breeding population of Canada geese (population estimate approximately 600,000) and regional migratory populations for Canada and snow geese are quite large (population estimate approximately 2,000,000) and stable (Sauer et al. 2008; USFWS 2009). American coot mortality has been recorded at other wind energy facilities but in low numbers (Johnson et al. 2002; Anderson et al. 2005; Kerlinger et al. 2006). Given the high numbers of coots using the area, some fatalities could occur at the Project. If fatalities of American coots do occur, they are not expected to impact the local population as the North Dakota populations currently are increasing slightly (Sauer et al. 2008). Mortality of American white pelicans has not been reported at a wind farm. However, the encounter rates suggest the potential exists for negative interactions for this species. American white pelicans are known to breed in North Dakota (Knopf and Evans 2004) and the large breeding population in North Dakota is showing a slight increase (Sauer et al. 2008). As a result, if any mortality were to occur, it is unlikely to have any population-level impact.

The Spring 2010 survey had considerably lower mean use and encounter rates than the Fall 2009 survey. In fact, no species were recorded as having high encounter rates during the Spring 2010 survey. The European starling, common grackle, and ring-billed gull had the highest encounter rates of all species observed during the Spring 2010 survey, but these rates were very low. European starlings, an introduced species, are not protected by any state or federal laws. Common grackle (Jain et al. 2007) mortality has been documented at other wind energy facilities. However, if fatalities occur at the Project, they are unlikely to have population-level impacts because regional populations (common grackle: 97 million; Blancher et al. 2007) appear to be increasing (Sauer et al. 2008). There are no reported fatalities for ring-billed gulls at other wind energy facilities with publicly available data. However, given the encounter rate, it is possible that limited mortality of ring-billed gulls could occur. Any mortality observed, should it occur at the Project, is not expect to impact the regional North Dakota population of ring-billed gulls as it is large and increasing (Sauer et al. 2008).

No sandhill crane fatality has been reported at newer generation wind energy facilities. Sandhill cranes tend to migrate at heights between 150 to 760 m (Tacha et al. 1992) putting migratory individuals above the height of operation turbines; however, the flight height profile of the cranes observed during the Fall 2009 survey suggests that these birds had either recently taken off from a nearby location, or were searching for a place to land. Theoretically, sandhill cranes are most at risk of collisions with turbines when individuals are either taking off from the ground or coming in to land within the Project Area or the surrounding area; they may also be at risk during weather events that reduce visibility. The central region of the North American population of sandhill cranes is very large (approximately 650,000 individuals according to the International Crane Foundation; http://www.savingcranes.org/sandhillcrane.html) and appears to be stable (Sauer et al.

2008). As a result, in the unlikely event of a facility-related fatality, it is unlikely to have population-level impact. No sandhill cranes were observed within the Project Area during the Spring 2010 survey.

Northern harriers and red-tailed hawks were the most commonly observed raptor species during the Fall 2009 avian surveys. Both species have been reported as fatalities at existing wind farms (Johnson et al. 2002; Young et al. 2003; Erickson et al. 2004; Jain 2005); however, their observed flight behavior in the Project Area suggests that the probability of turbine-related fatalities is low. Swainson's hawk was the most commonly observed raptor during the Spring 2010 avian survey. Swainson's hawk fatalities have been reported at existing wind farms (Erickson et al. 2004); however, the low encounter rate observed in the Project Area suggests a low probability of turbine-related fatalities. Due to the number of raptor nests observed in the Project Area during the raptor nest survey, the risk for turbine-related fatalities may increase for nesting raptors. This would likely occur in late spring to early fall as the young begin to fledge from their nests.

Currently, two turbines with slightly different rotor diameters and hub heights are being considered for the Project; the Siemens SWT 2.3-101 turbine and the GE 2.5xl turbine. As described in Section 2.1.2.2.1, the Siemens SWT 2.3-101 has an 80-m hub height, and the GE 2.5xl turbine has an 85-m hub height and a 100-m or 103-m diameter rotor. In order to assess impacts for the turbine models under consideration for the Project, a Turbine Model Comparison for the Fall 2009 and Spring 2010 Avian Surveys was performed (Appendix D). The comparison provides a comprehensive analysis on the potential impacts to avian species for each turbine model and respective rotor diameters as a result of Project operation. There were no substantial differences between the number of birds documented within each RSA nor were there substantial differences in the encounter rates calculated for the birds within those differing RSAs (Tetra Tech 2010f, Appendix D).

Assessing the full range of impacts to bats is challenging given the limited research indicating how bats respond to disturbances to preferred habitats. Direct mortality resulting from turbine collisions and barotrauma would be main impact to bats. The siting of turbines away from wetland and riparian areas (e.g., preferred bat foraging habitats) would minimize the potential for direct impact.

Temporary impacts to wildlife could occur during construction activities. These impacts could include temporary habitat loss, noise and dust disturbance, and increased injury and mortality due to vehicle collisions. In addition to mortality associated with wind farms, concerns have been raised that some bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006). For example, at the Buffalo Ridge wind energy facility near Lake Benton in Minnesota, densities of male songbirds were significantly lower in CRP grasslands containing turbines than in CRP grasslands without turbines (Leddy et al. 1999). Reduced abundance of grassland songbirds was found within 50 m of a turbine pad for a wind farm in Washington and Oregon, but the investigators attributed displacement to the direct loss of habitat or reduced habitat quality and not the presence of the turbines (Erickson et al. 2004). However, no studies have addressed whether or not these avoidance effects are temporary (i.e., the birds may habituate to the presence of turbines over time) or permanent.

There are several avoidance and mitigative measures, the Developer has built into the Project design (Chapter 2, particularly Section 2.1.2) that would work in tandem to minimize impacts to wildlife. These include:

- Minimizing permanent impacts on wetlands during design and construction of turbines and associated infrastructure, thereby reducing impacts to wildlife such as waterfowl, waterbirds and bats;

- Minimizing disturbance and fragmentation of native prairie through project design and the measures indicated above for vegetation;

- Protecting existing trees and shrubs where practicable.

- Re-seeding impacted non-cropland and pasture areas with a native seeding mix as recommended by USFWS and NRCS;

- Developing a management plan to control noxious weeds in the immediate vicinity of the turbines, access roads, and associated facilities, immediately after construction and periodically for the life of the Project;

- Burying the electrical collection system connecting the turbines to the Project substation underground, if site conditions are favorable;

- Implementing an Avian and Bat Protection Plan (ABPP) that is beign developed in conjunction with TVA and the USFWS. This ABPP would include post-construction monitoring strategies, personnel training, the development of a Wildlife Response and Reporting System, and an adaptive management strategy;

- Establishing a vehicular speed limit on Project roads;

- Erecting free-standing permanent met towers

- Providing a setback for turbines, substations, and buildings of at least 0.25 mi from USFWS WPAs; and

- In the ongoing consultation with the USFWS under Section 7 of the ESA, committing to multi-year post-construction monitoring.

Rare, Threatened and Endangered Species

No federal threatened and endangered species have been detected within the Project Area to date and, in the unlikely event that they do occur, potential impacts would be minimized by proposed avoidance and minimization measures described in Section 2.1.2, and as will be stipulated in the Biological Assessment (BA), Biological Opinion (BO) and concurrences resulting from the ongoing consultation with the USFWS under Section 7 of the ESA. The ESA requires the protection of species that are federally listed as threatened or endangered. Substantial changes to the habitats of these species, or projects that have the potential to result in "take," require permitting from the USFWS. According to the USFWS (2008b), of the federally listed species known to occur within North Dakota, only the whooping crane, piping plover, and gray wolf are known from McIntosh County. Documentation for the completed consultation will be included in the final EA.

Whooping Crane

Although unlikely, potential impacts on whooping cranes as a result of the Proposed Action include direct impacts, such as collisions with wind turbines, the Project substation, or other

Project buildings, as well as indirect impacts, such as actual loss of habitat due to construction activities or functional loss of habitat due to crane avoidance. The likelihood of direct impacts on whooping cranes as a result of the proposed action is low, primarily because of a low likelihood of cranes occurring in the Project Area. The Project Area is located on the eastern edge of the whooping crane migration corridor and is outside of the 85 percentage of sightings buffer; in other words, 85 percent of whooping crane observations have occurred closer to the center of the migration corridor than have occurred at distances similar or greater than the Project's from the corridor center. There are no reported incidents of turbine-related crane fatalities of whooping cranes or sandhill cranes, and the Developer is planning to bury all collection systems, thereby eliminating the possibility of a power line collision.

The presence of a wind farm could cause whooping cranes to avoid the wetlands in the vicinity of the Project (USFWS 2009c; Appendix A). As a result, the proposed action could result in the long-term, indirect impact of the loss of potential roosting habitat. However, given the wide availability of potential roosting and foraging habitat on the landscape, it is unlikely that this loss of potential habitat would negatively affect whooping cranes at the individual or population level. Additionally, the avoidance and minimization measures identified in Section 2.1.2 of this EA and the draft BA, in conjunction with conservation measures proposed in the draft BA would further minimize the potential for any effect to the species. These proposed measures include conservation of habitat through the funding of the purchase of land or conservation easements to offset the potential that whooping cranes would no longer use the area for roosting habitat, potential direct and indirect impacts to piping plovers and potential for loss of Sprague's pipet breeding habitat. There are approximately 3,086 acres of wetlands within 0.5 miles of turbines that is potentially suitable for stopover use by whooping cranes in migration. The measures proposed in the draft BA include a third party administrator of funds with a focus on identifying and targeting wetland acquisitions with the following characteristics: maximum wetland coverage; closer to the center of the whooping crane corridor (i.e., areas with greater habitat attractiveness and likelihood of usage); and for which surrounding upland habitat is native prairie.

No whooping cranes were observed within the Project Area during fall 2009 (mid-August to mid-November) or spring 2010 (late March – mid-June) point count surveys. However, sandhill cranes were observed migrating south through the Project Area in large numbers in late fall 2009; most of these birds were observed flying at the rotor swept height of the proposed turbines but none were observed on the ground in the Project Area. As sandhill cranes tend to migrate at heights of less than 1,600 m with 75 percent observed migrating at heights between 150 – 760 m (Tacha et al. 1992), the flight height profile of the cranes observed in the Project Area suggests that these birds had either recently taken off from a nearby stopover location or were searching for a place to land. Sandhill crane habitat use patterns are often used as surrogates for whooping crane habitat use patterns, given the similarities between the two closely related species. Based on the low probability of site usage, the avoidance and minimization measures (most notably the burying of all collection systems), and CPV's commitments and conservation measures in the Biological Assessment being developed under the Section 7 consultation between TVA and the USFWS, the Project may affect but is not likely to adversely affect the whooping crane.

Piping Plover

Although the Project Area contains numerous wetlands, none are known to be alkaline in nature; therefore, it is unlikely that the piping plover utilizes the Project Area for breeding.

Given the home range sizes of breeding piping plovers, it is possible that these wetland areas could be used for resting and feeding by plovers breeding elsewhere (e.g., within designated Critical Habitat just to the south of the project area. However, the implementation of 0.5-mi construction setbacks from Critical Habitat (Chapter 3.0) would greatly minimize the potential for piping plover home ranges to intersect with Project facilities. In the event that plovers do utilize the Project Area, the minimization of permanent wetland impacts and the burying of all collection systems would minimize potential direct impacts. No piping plovers were observed within the Project Area during fall 2009 (mid-August to mid-November) or spring 2010 (mid-March to mid-June) point count surveys.

Available evidence suggests that piping plovers are not prone to collisions with turbines or meteorological towers (i.e., no piping plover fatality has been reported at a wind energy facility); however, it is possible that this absence of fatality data is a product of small population size rather than a product of plover avoidance behavior or lack of susceptibility.

Given the possibility of collisions by piping plovers with turbines or other Project facilities over the life of the Project, the Proposed Action is likely to adversely affect the piping plover. Based on this determination, TVA is requesting formal consultation with the USFWS and proposes a take limit of four piping plovers over the life of the Project. Additionally, any conservation measures implemented for the offset of whooping crane impacts will be sufficient to offset this level of impact to the piping plover. The project description included in Section 7 consultation documents includes multi-year monitoring, which will be additionally incorporated into commitments of the Final EA.

As there would be no construction in designated Critical Habitat and no permanent changes to water quantity or quality associated with the Project, it would not affect designated Critical Habitat.

Gray Wolf

It is possible that a transient individual gray wolf may move through the Project Area, thereby being exposed to potential negative interactions with moving vehicles. However, the establishment of speed limits on Project roads would minimize the potential for collisions. No other aspect of Project construction or operation would affect the survival of a transient individual. Therefore, the Proposed Action may affect but is not likely to adversely affect the gray wolf.

Sprague's Pipit

No Sprague's pipits were observed within the Project Area during Fall 2009 (mid-August to mid-November) or Spring 2010 (mid-March to mid-June) point count surveys, nor during additional non-road-based survey efforts in Spring 2010. No Sprague's pipit fatality has been reported at a wind farm. A closely related and very common species, the American pipit (*Anthus rubescens*), is rarely reported as a fatality during post-construction mortality monitoring of newer generation turbines, suggesting that, while possible, turbine collisions by Sprague's pipit are unlikely.

The Project Area contains habitat that is suitable for Sprague's pipits. There are currently seven patches of native prairie greater than 358 acres within the Project Area. This patch size is considered the minimum patch size required to support Sprague's pipit breeding activity (Davis 2004 in USFWS 2010). Of these seven patches, two will be fragmented by

Project infrastructure such that the resulting patches will be too small for breeding Sprague's pipit; the fragmentation of these two patches amounts to the loss of 988 acres of potential pipit breeding habitat, even though the patches will remain as native prairie. Following Project construction, 4,475 acres of potential Sprague's pipit habitat will remain within the Project Area, the average patch size of remaining native prairie would be 559 acres.

In the event of this species occurring within the Project Area, the substantial acreage of remaining suitable breading habitat, the burying of collection systems (i.e., elimination of power line collision risk) during Project construction and the purchase of native prairie as part of the wetland mitigation strategy would minimize impacts to pipits. Therefore, the Proposed Action may affect but is not likely to adversely affect the Sprague's pipit.

Bald Eagle

Although no longer protected under the ESA, the bald eagle is still protected by the BGEPA and the MBTA. The bald eagle currently nests along the Missouri River in North Dakota. Three bald eagles were observed during the fall 2009 point count surveys flying at 400 m (above turbine height) approximately 1 mi to the southwest of the Project in August and one bald eagle was observed during the Spring 2010 point count surveys flying at 30 m (at RSA height) outside the Project Area in March. Although none these individuals were within the Project Area, the observation does confirm the potential utilization of the area by bald eagles, although the probability of negative interaction with Project facilities is low. The construction of turbines with tubular towers (to minimize perching opportunities), the burying of all collection systems associated with the Project (to eliminate collision risk with power lines), and the avoidance of permanent wetland impacts (to minimize impacts to foraging locations) would greatly minimize potential impacts to this species. For bald eagles, due to their low use of the Project Area during fall, negative turbine-related impacts are unlikely during this season.

Dakota Skipper

Although the Project Area does contain potential Dakota skipper habitat, it is unlikely to occur in the Project Area. The USFWS does not list this species as potentially occurring within McIntosh County. The Dakota skipper has been recorded in 16 counties in North Dakota, the closest being Stutsman County (approximately 30 mi north from its nearest point to McIntosh County). The minimization of impacts to native prairie during Project construction would minimize impacts to Dakota skippers. Therefore, the Project may affect but is not likely to adversely affect the Dakota skipper.

Cumulative Effects

Given the current economic situation, it is difficult and somewhat speculative to predict the continued development of wind energy within the Action Area, as defined for the purposes of the biological assessment developed in Section 7 ESA coordination (i.e., whooping crane migration corridor within North Dakota). The United States Energy Information Association (USEIA) predicts a fairly consistent growth in wind-powered capacity nationally until 2013, after which point the projected growth slows dramatically (USEIA 2010). According to the American Wind Energy Association, there are 1,222 MW of installed wind power in North Dakota (AWEA 2010), with an additional 1,400 MW under construction or proposed for construction by 2012 (NDPSC 2008). This projected near-term growth in wind-powered capacity likely would be accompanied by a growth in transmission infrastructure required to

deliver newly generated capacity to market. North Dakota is part of the Upper Midwest Transmission Development Initiative (UMTDI), the goal of which is to "identify and resolve regional transmission planning and cost allocation issues associated with the delivery of renewable energy from wind rich areas" (UMTDI 2010). The Midwest ISO Expansion Plan (of which North Dakota is a participant) has also formalized a commitment to the continued expansion and improvement of transmission capacity (MISO 2009). This projected growth in capacity and associated transmission would increase the potential for direct effects on birds resulting from collisions with turbines or transmission lines, and for indirect effects associated with habitat fragmentation and potential disturbance effects. However, other than a very short interconnect to the existing, on-site transmission as discussed in Chapter 2,the Project has no new construction of transmission right of way associated with it. Careful siting of turbines (e.g., minimize siting in wetland areas) and burying of collection systems, such as proposed for the Project, additionally reduces the potential for cumulatively greater impacts from other future wind energy development.

Other activities with potential to affect biological resources include an overall expansion of oil and gas development in the Action Area (USEIA 2010). In addition to the habitat disturbance associated with the footprint of each well, each new well would require the construction of new roads (Naugle et al. 2009) which can result in habitat fragmentation and behavioral disruption (e.g., barrier effects) if not carefully designed.

Less than 30 percent of native prairie in the Great Plains remains relative to the pre-colonial period (Stephens et al. 2008) and the pace of prairie conversion, primarily due to agricultural activity, has been increasing throughout the region (United States Government Accountability Office [USGAO] 2007, Fargione et al. 2009). The Project efforts described in Sections 2.1.2 and 4.3.1 - Vegetation, to avoid and reduce effects to native prairie and to implement protective conservation measures, would result in the Project having a very minor, to potentially beneficial effect (with implementation of the conservation easements and land acquisition measures proposed in the draft BA under development).

In summary, past actions described elsewhere in the document, primarily agricultural operations, two existing wind farms within 25 mi, and other development have resulted in a loss of native habitats. There would be an additional incremental minor loss of native habitats due to project implementation. The Project would add to the existing wind development in the state and contribute to the cumulative effects on wildlife such as birds and bats that migrate through the area. Additional cumulative disturbances as a result of construction and maintenance of the Project would minutely increase the risk for spreading noxious weeds. Proposed monitoring and mitigation measures to be implemented for this Project in response to monitoring would minimize or eliminate the contribution of the Project to potential cumulative impacts on biological resources.

4.3.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, impacts to plants and wildlife associated with construction and operation of the proposed Project would not occur. These biological resources would be expected to persist within the Project Area in their existing state, as described in Chapter 3.0.

Cumulative Effects
The No Action Alternative would have no direct or indirect effects on plants and wildlife. Consequently, no incremental effects would be added to past, present, or reasonably

foreseeable future actions, and no cumulative effects to these biological resources would occur.

4.4. Cultural Resources

4.4.1. Proposed Action

The APE for archaeology consists of all areas in which land disturbing activities resulting from construction, operation and decommissioning of Project facilities would take place (Figure 3-4). The APE for architecture consists of a 0.5-mi radius surrounding the proposed turbines and associated aboveground facilities (Figure 3-4). Pursuant to 36 CFR 800, TVA, in consultation with the SHPO and other consulting parties, has evaluated the potential for occurrence of cultural resources within the APE that meet criteria for NRHP eligibility. Class II architectural and Class III archaeological field investigations followed the North Dakota SHPO Guidelines Manual for Cultural Resources Inventory Projects (North Dakota State Historic Preservation Office 2009). In total, five archaeological sites and 16 architectural properties were recorded within the APE for archaeology and architecture, respectively. TVA finds that the 16 architectural properties are ineligible for the NRHP. The Project layout was modified to avoid construction effects to archaeological sites that may have the potential to be eligible to the NRHP. TVA is consulting with the North Dakota SHPO for concurrence with TVA's findings and recommendations and federally recognized tribes regarding any cultural properties within the proposed project's area that may be of religious and cultural significance and eligible for the NRHP. The results of these consultations will be included in the final EA and associated appendices.

Cumulative Effects
The construction and operation of the Proposed Action would introduce new man-made features on the landscape which would be within the viewshed of some standing structures. No previously recorded NRHP-listed or eligible historical architectural resources were identified within the APE for architecture and no NRHP-listed properties are located within 5 mi of the Project Area. TVA, in consultation with the SHPO and interested federally recognized tribes with whom the agency is coordinating, would avoid adverse effects to NRHP-listed or eligible cultural resources. If a NRHP-listed or eligible cultural resource cannot be avoided, TVA in consultation with the SHPO and interested federally recognized tribes would identify and implement measures to mitigate or minimize adverse effects.

4.4.2. No Action Alternative

The No Action Alternative would result in no effects to NRHP-listed or eligible archaeological and historic architectural resources.

Cumulative Effects
There would be no cumulative effects on NRHP-listed or eligible archaeological or historic architectural resources that would result from the No Action Alternative.

4.5. Land Use

4.5.1. Proposed Action

Land use within the Project Area would largely remain unchanged as a result of the Project. Landowners often continue to plant crops and graze livestock to the edge of Project

facilities at other wind farms throughout the United States. About 476 acres of land would be temporarily affected during construction activities (including 223 acres of native prairie). About 73 acres of land (including 36 acres of native prairie) would be permanently affected by the footprint of the project structures. CPV is committed to continue working with the landowners during the ongoing micro-siting of the Project facilities to minimize land use disruptions. CPV would also work with landowners to avoid impacts on drainage tiles and irrigation infrastructure during construction. Additional areas may need to be temporarily disturbed during construction for laydown areas and staging areas. However, these areas would be returned to their original contours and reseeded as necessary. Wind turbines are sited a minimum of 1,400 ft from residences. The closest residence is slightly more than that distance from a turbine site**.** There would be no displacement of occupied residences or industrial facilities as a result of construction and operation of the Project.

The Project would not directly affect USFWS grassland easement properties since the Project has been designed to avoid these areas completely. Up to approximately 25 acres of CRP land may be removed due to the Project. CPV is working with Project landowners and the FSA to have affected CRP lands removed from the program, if necessary, and through landowners, would provide compensation to the FSA for any reduction in CRP lands.

Cumulative Effects
As discussed in 4.5.1.1, temporary and permanent disturbance from the Project would constitute a minor percentage of the 17,400 acre Project Area (about 2.7% temporarily and 0.004% permanently) and the amount of land use that was permanently altered would constitute only a minute percentage of land available in the county and region currently available for similar agricultural land use. No adverse cumulative effects to land use due to the location of the Project in relation to existing or planned facilities and other industrial development are anticipated. Assuming similar levels of land use effects from other existing or reasonably foreseeable wind farms in the area, the cumulative impact to available farm and grazing land in the area would also constitute only a minor permanent change in land use.

4.5.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, the land use impacts associated with the construction and operation of the proposed Project would not occur. Benefits from potential preservation of land for continuing agricultural production would also not occur under the No Action Alternative.

Cumulative Effects
As noted, the No Action Alternative would have no direct or indirect adverse effects on land use within the Project Area. Consequently, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no incremental effects to these resources would occur.

4.6. Recreational Resources

4.6.1. Proposed Action

In general, impacts on nearby recreational areas would be visual in nature as described in Chapter 3.6, primarily affecting individuals using public or private property within or adjacent

to the Project Area for hunting, fishing, trapping, or nature observation. To minimize physical intrusion on recreational activities, Project turbines, buildings, and the substation would be sited at least 0.25 mi from nearby WPAs (the closest is slightly more distant). The Project would have negligible impacts on existing recreational opportunities near the Project Area, which are the Ashley and Wishek nine-hole public golf course and two city parks in Ashley.

Additional impacts on recreational uses due to the Project include increased traffic along county roads in the area, although these impacts would be temporary in nature and primarily associated with the construction period (up to 18 months). During construction, local wildlife may be temporarily displaced but then may return to the area during Project operations. Finally, potential impacts on the avian species associated with the WPAs are addressed in Chapter 4.3.

Cumulative Effects
No adverse cumulative effects due to the location of the Project in relation to existing or planned facilities and other industrial development are anticipated. The Project is the only identified reasonable foreseeable project in McIntosh County. Visitors at recreational sites are unlikely to view wind turbines from other wind energy projects at the same time as viewing the Project as the nearest wind farm is located 10 mi east of the Project.

4.6.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, the impacts to recreational resources associated with the construction and operation of the proposed Project would not occur.

Cumulative Effects
As noted, the No Action Alternative would have no direct or indirect adverse effects on recreational resources within and in the vicinity of the Project Area. Consequently, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no incremental effects to these resources would occur.

4.7. Visual Resources

4.7.1. Proposed Action

Visual resource assessment depends upon identifying affected landscapes, the general qualities of the landscape, sensitivity of the viewers of that landscape and the distance of that landscape to the viewers. As noted in Section 3.7 the visual setting of the Project Area is a rural rolling landscape with farming, grazing, and some residential development (Figure 3-6). Existing features in the viewshed for the Project Area include linear features of highways and county roads, overhead electrical transmission lines, homesteads, communications towers, fencing and an existing wind farm depending upon visibility conditions. Visual impacts from the Project would include the addition of physical structures (turbines, substation, O&M building) as well as necessary lighting of turbines and ancillary facilities. Some turbines would require lighting by the FAA for aviation safety which would be minimized to the smallest number and intensity allowed by the FAA. No additional overhead transmission lines are proposed with this Project.

Nearby visual receptors in the foreground area include approximately 15 potentially occupied homes, the closest of which is approximately 1400 ft from a turbine site, as well as more distant farmsteads and low-level local traffic typically not engaged in scenic or pleasure driving along the public use county and municipal roads in the middleground area. Depending upon terrain and visibility, a portion of the turbines could be seen as minor background elements along the horizon from parts of the cities of Ashley, Wishek and Lehr and other areas within McIntosh County and its neighboring counties.

Visual sensitivity is dependent upon viewer attitudes, amount of use and types of activities in which people are engaged when viewing an object. In general, higher areas of viewer sensitivity are correlated with where people live and places where people are engaged in recreational outdoor activities or scenic or pleasure driving. Visual contrast would likely be considered moderate for the few nearby local residents, many of whom are landowner participants in the Project; and weak for those occupying more distant farmsteads, utilizing local roads or living as far as the cities of Ashley, Wishek or Lehr or other areas within McIntosh and its neighboring counties.

Since the Project Area does not contain highly distinctive landscape features, has a low population density, is not frequently accessed by other than the local public, and experiences very low recreational use, the visual impacts from development of the Project would be overall limited and minor. The proposed Project would add to the past impacts to the visual landscape with additional modern structures but the Project Area would retain its overall rural setting and appearance.

Additionally, a wind turbine's rotating blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomenon to people at nearby occupied residences or public gathering places. The potential impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typical during sunrise and sunset times of the day. However, when the sun angle is very low (less than 3 degrees), the light has to pass through more atmosphere and becomes too diffuse to form a coherent shadow. Shadow flicker would not occur when the sun is obscured by clouds/fog, at night, or when the source turbine is not operating. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. In general, the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurs nearest the wind turbines. The general setback of turbines of at least 1,400 ft from occupied residences would act as a mitigation measure to minimize potential adverse shadow flicker impacts.

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. The blade pass frequency for any of the wind turbines that may be selected would be less than 1.0 Hertz (Hz) (less than 1 alternation per second). From a health standpoint, such low frequencies generated by wind turbines are harmless. Public concerns that flickering light from wind turbines can have negative health effects, such as triggering seizures in people with epilepsy, are unfounded. Epilepsy Action (working name for the British Epilepsy Foundation) states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz. Since the blade pass frequency for any of the wind turbines that may be selected would be less than 1.0 Hz, no negative health effects to individuals with photosensitive epilepsy are anticipated.

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

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPro software package. The WindPro analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors out to 1,500 m. The realistic ("expected") impact condition scenario is based on the following assumptions:

- The elevation and position geometries of the wind turbines and surrounding receptors (houses);
- The position of the sun and the incident sunlight angle relative to the wind turbine and receptors on a minute by minute basis over the course of a year;
- Historical sunshine hours availability (percent of total available);
- Estimated wind turbine operations and orientation (based on approximately two years (June 2008 through May 2010) of on-site measured wind data (wind speed / wind direction frequency distribution); and
- Receptor viewpoint (i.e., house windows) conservatively assumed to always be directly facing turbine to sun line of sight ("greenhouse mode").

WindPro incorporates terrain elevation contour information and the analysis accounts for terrain elevation differences. The sun's path with respect to each turbine location is calculated by the software to determine the cast shadow paths every minute over a full year. Sun angles less than three degrees above horizon were excluded since light at these low angles has to pass through more atmosphere and becomes too diffuse to form a coherent shadow.

A total of 15 receptor locations were considered. These locations correspond to potentially occupied houses in the Project site area. A receptor in the model is defined as a one m^2 area (approximate size of a typical window), one m above ground level.

WindPro predicts that shadow flicker impacts will primarily occur near to the wind turbines. A detailed WindPro shadow flicker analysis results summary is provided the Shadow Flicker Impact Analysis report provided in Appendix H. The maximum predicted shadow flicker impact at any receptor is 38 hours, 11 minutes per year, which is only approximately 0.9 percent of the potential available daylight hours. Only 1 of the 15 receptors modeled had shadow flicker impact predicted more than 30 hours per year. The landowner of this receptor confirmed this is an unoccupied and uninhabitable former residence. The analysis of potential shadow flicker impacts from the proposed wind farm turbines on nearby houses (receptors) shows that shadow flicker impacts are expected to be minor. The analysis conducted is conservative and actual shadow flicker impacts are likely to be less than those presented here. The analysis assumes that the houses (receptors) all have a direct in line view of the incoming shadow flicker sunlight and does not account for trees or other obstructions. In reality, the windows of many houses will not face the sun directly for the key shadow flicker impact times. Should the need be identified however, CPV will consider and work with individual landowners to assess need for additional measures such as strategic vegetative screening at affected occupied residences and/or installation of curtains and blinds on the windows facing the turbine casting the shadows. For these reasons,

shadow flicker impacts are expected to be less than estimated with the conservative analysis, and shadow flicker is not expected to be a significant environmental impact.

Cumulative Effects
Cumulative visual impacts with existing or proposed wind energy projects in the analysis area are anticipated to be negligible due to the distance between facilities, topography, met conditions, and limitations to human vision over many miles. Depending upon areas from which the Project is visible, it would generally contribute additional weak visual contrast to the predominantly rural landscape. At some points, as an observer traveled in the general direction of another of the identified existing or reasonably foreseeable wind energy projects, the weak visual contrast of the Project would incrementally contribute to overall visual effects.

Shadow flicker impacts beyond 1,000 m (0.62 mi) are generally considered of low intensity, and shadow flicker impacts beyond 1,500 m (0.93 mi) are generally considered imperceptible. Since all neighboring wind farms (both existing and proposed) are well beyond this distance (>16 mi), no cumulative shadow flicker impact would occur at residences in Project Area.

4.7.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, impacts to visual resources associated with construction and operation of the proposed Project would not occur. These resources would be expected to persist within the Project Area in their existing state, as described in Chapter 3.0.

Cumulative Effects
As noted, the No Action Alternative would have no direct or indirect effects on visual resources. Consequently, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no cumulative effects to these resources would occur.

4.8. Noise

4.8.1. Proposed Action

McIntosh County does not have a zoning ordinance or any specific noise-related provisions applicable to the Project. At the state level, the NDAC (Article 69-06-08, Section 3) requires that the potential for adverse impacts at noise sensitive areas (NSAs) be assessed during the site selection process; however, there are no numerical decibel limits or formal compliance requirements provided by any other agency at the state level. Fifteen potentially occupied homes were identified in the acoustic study area (Appendix I) as noise receptors. The closest was slightly more than 1400 feet from the nearest turbine. No other sensitive receptors were identified.

In the absence of noise requirements at the local and state level, several federal guidance documents were considered in the development of internal Project acoustic design goals. The United States Department of Housing and Urban Development (HUD) has a noise program with environmental noise abatement and control standards (24 CFR 51.103). The HUD provides a day-night average sound level (L_{dn}) of 65 dBA, which is considered an acceptable external noise level to a residence or other noise sensitive land use type. The

Federal Interagency Committee on Noise (FICAN) published a document in 1992 entitled "Federal Agency Review of Selected Airport Noise Analysis Issues." Their report presents a review of existing scientific measurement techniques for assessing noise impacts, technical and policy recommendations regarding the measurement of noise, health and welfare effects, environmental degradation/impact, land use planning, education of the public, and noise considerations during the NEPA process. The FICAN report recommends limiting the number of occurrences where NSAs will be at or above an L_{dn} threshold of 65 dBA and have an incremental increase of 1.5 dBA or greater. Further analysis and consideration of candidate mitigation is recommended by FICAN at NSAs between an L_{dn} of 60-65 dBA. The USEPA published a document entitled "Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety." For outdoor residential areas, the recommended EPA guideline is an L_{dn} of 55 dBA (equivalent to an L_{eq} (1-hour) of 48.6 dBA, assuming continuous 24-hour operation. The USEPA sound level guidelines state that the levels identified are low enough to be protective with an adequate margin of safety. Being the most stringent of the suggested criteria, the USEPA sound level guidelines were used as the basis in the Acoustic Assessment (Appendix I).

Potential acoustic impacts associated with Project construction and operation were assessed for both proposed turbine types (GE 2.5 xl at the 103 m rotor diameter and SWT-2.3-101) and the on-site Project electrical substation. Project construction would be completed in four phases including site clearing, excavation, foundation work, and balance of plant erection including turbine installation. Sound levels resulting from construction activities vary significantly depending on several factors such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. In addition, construction activity will generate traffic having potential noise effects, such as trucks traveling to and from the site on public roads. Traffic noise is categorized into two categories: (1) the noise that will occur during the initial temporary traffic movements related to turbine delivery, haulage of components and remaining construction; and (2) maintenance and ongoing traffic from staff and contractors, which is expected to be minor. The construction of the Project may cause short-term but unavoidable noise impacts depending on the construction activity being performed and the distance to the receptor.

A screening-level acoustic modeling analysis was conducted for the Project layout dated April 21, 2010 and manufacturer sound data reported per International Electrotechnical Commission (IEC) standard for both WTG models. The acoustic modeling analysis employed the most recent version of DataKustic GmbH's CadnaA, a comprehensive three-dimensional acoustic software model that conforms to the Organization for International Standardization (ISO) standard ISO 9613-2 "Attenuation of Sound during Propagation Outdoors." Calculations were completed for meteorological conditions corresponding to downwind propagation, or equivalently, propagation under a well-developed moderate ground-based temperature inversion. Though somewhat infrequent according the ISO 9613-2 procedures, Project sound levels resulting from operation during periodic anomalous meteorological conditions were also considered in the modeling analysis. Site-specific topographical information was used in the model in addition to terrain conditions, vegetation type, and ground cover. Sound attenuation through foliage and diffraction around and over existing anthropogenic structures such as buildings were ignored under all acoustic modeling scenarios. The results are therefore representative of defoliate wintertime conditions. The acoustic model assumes that all turbines would operate continuously and concurrently at the maximum rated sound level per manufacturer specifications for a given operational condition. In addition, the on-site electrical substation

was modeled cumulatively with Project turbines. The operation analysis was completed for turbine cut-in and full rotational conditions and results are given in the form of color-coded sound contour figures and in tabular format by receptor location in Appendix I.

Acoustic modeling results showed that the Project has been adequately designed to operate in compliance with USEPA guideline limits and therefore would also be in adherence to HUD standards and FICAN recommendations on environmental noise. The setback of at least 1,400 ft from occupied residences minimizes the potential for adverse sound impacts at NSAs. For further information on the acoustic analysis and results are provided in Appendix I.

Cumulative Effects
A project would need to be located within approximately 2 to 3 kilometers (1.2 to 1.8 mi) of the proposed Project in order to present a possible cumulative influence on sound. All neighboring wind energy projects identified in Figure 4-1, which are both existing and proposed, are located well beyond this distance (>16 mi); therefore, no cumulative noise impacts would be expected to result at any NSAs within the Project Area.

4.8.2. No Action Alternative

he Project would be built. As a result, noise impacts associated with the construction and operation of the proposed Project would not occur. The acoustic environment would be expected to remain unchanged within the Project Area in its existing state, as described in Chapter 3.0.

Cumulative Effects
As noted, the No Action Alternative would have no direct or indirect noise impacts within the Project Area. Consequently, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no incremental noise impacts would occur.

4.9. Air Quality and Climate Change

4.9.1. Proposed Action

The Project's primary indirect effect on air quality and climate change would be a likely net reduction in greenhouse gas emissions through the likely displacement of fossil fuel use at conventional electric power generating plants as the Project would generate electricity without producing air emissions. This predicted effect is based on the liberal assumption that each MW-hour of electricity generated by the Project would reduce by one MW-hour the amount of electricity required from conventional generating plants in order to meet the demand of end users, with a consequent reduction in fossil fuel use and GHG emissions (predominantly CO_2).

At present, Komanoff (2009) estimates that each MW-hour of generation from a typical wind farm displaces approximately 90 percent of the fossil fuel required to generate a MW-hour of electricity at a conventional plant. However, it can be difficult to quantify the GHG emissions that would be offset by the Project accurately. While the Project would interconnect to a transmission line operated by MDU, the power would be sold to TVA under a PPA. Therefore, it cannot be known with certainty which specific generating plants would avoid their use of fossil fuel. For example, the reduced fossil fuel use may occur within local power systems such as MDU or the Basin Electric Power Cooperative, or the

reduction may occur within the TVA system. A reduction in generation from a natural-gas-fired power plant would cause a smaller decrease in CO_2 emissions than the same output reduction from a coal-fired plant.

Since it is not known with certainty what proportion of the displaced fossil fuel use will be from coal-fired versus gas-fired plants, a range for the potential quantity of avoided CO_2 emissions due to the Project can be estimated. Using emission factors published by the U.S. Energy Information Agency for 2008 (USEIA, 2010a), each MW-hour of wind power is equivalent to avoiding approximately 1.0 tons of CO_2 emissions from a coal-fired plant, or 0.6 tons of CO_2 emissions from a gas-fired plant. Assuming a year-round capacity factor of 42 percent for the Project (equivalent to 84 MW average year-round generation for a 200-MW farm), up to 700,000 tons of coal-fired CO_2 emissions, or up to 400,000 tons of gas-fired CO_2 emissions, could be avoided per year during the life of the Project.

Direct air quality impacts from the Project would be minor, and would occur primarily during construction. Emissions of regulated pollutants would be *de minimis* and are not expected to cause an exceedance of state or federal air quality standards. Because predicted emissions are below regulatory thresholds, the NDDOH Air Quality Program does not require a permit for the construction or operation of the Project.

Construction of the wind turbines, collector lines, roads, and substation would result in minor emissions of PM_{10} and $PM_{2.5}$ in the form of fugitive dust. These dust emissions would be generated by the movement of vehicles and equipment on unpaved roads, and by the operation of the concrete batch plant. Combustion of fuel in vehicles and construction equipment would also cause minor emissions of nitrogen oxides (NOx), CO, SO_2, PM_{10}, $PM_{2.5}$, and VOC. Emissions of hazardous air pollutants from the operation of vehicles and construction equipment would be very small. These impacts would be restricted to short periods of construction at relatively small individual wind turbine sites, along the proposed collector lines and roads, and at the substation. The limited duration of construction, along with implementation of the environmental protection measures presented in Chapter 5, is expected to mitigate air quality effects from the Proposed Action. Fugitive dust emissions occurring during construction would be controlled in an efficient and effective manner by using best management practices such as limiting speeds of vehicles and wateing and dust suppression on roadways, as appropriate.

Operation of the wind turbines would not generate any air pollutant emissions. Because no greenhouse gases are generated by operation of the wind turbines, there would also be no direct impacts on climate change. Once construction is completed, the only direct air quality impacts would be minor, short-duration emissions of fugitive dust and tailpipe exhaust from the occasional operation of maintenance vehicles on the unpaved service roads.

Proposed new or modified sources locating within 300 km of a Class I air quality area are asked to consult with the Federal Land Manager to determine whether emission impact modeling to the Class I area should be conducted and submitted to the Federal Land Manager for review. The nearest Class I air quality area, Theodore Roosevelt National Park, is approximately 314 km from the Project Area. Construction and operation of the Project would have no impact on visibility or ozone-sensitive plant species, which have been identified as AQRVs at Theodore Roosevelt National Park.

Cumulative Effects

The main direct air quality impacts of the Project would be limited to the construction period. Because these effects would be of *de minimis* and of short duration, there would be negligible if any cumulative effects on air quality.

4.9.2. No Action Alternative

If the Project is not constructed, no direct effects on air quality would occur. Any indirect benefits due to avoidance of CO_2 emissions from reduced fossil fuel use in other power plants would not occur.

Cumulative Effects
Because the No Action Alternative would not cause any direct or indirect effects on air quality by itself, there would also be no cumulative effects.

4.10. Socioeconomics

4.10.1. Proposed Action

Overall, the Project is expected to have positive impacts on landowners and McIntosh County. Construction and operation of the Project would result in a long-term beneficial impact on the county's tax base. This would contribute to improving the local economy and strengthening and diversifying the economic base of the region. Additionally, Project landowners whose land is utilized would receive payments throughout the life of the Project. This would further contribute to strengthening the local economy and its tax base.

Local contractors would be used to the extent practicable. Wages and salaries paid to local contractors would directly benefit the regional economy. Wages and salaries paid to non-local contractors would likely benefit the regional economy as well. This benefit would come in the form of expenditures for supplies, lodging, fuel, and other services such as hotels, restaurants, etc. Additionally, the McIntosh County economy would benefit from the infusion of state and local taxes paid by CPV. The Developer expects that on average the Project would generate a total of over $1,000,000 per year through state and local property, income, sales, and payroll taxes.

The construction period could commence from as early as July 2011 and conclude as late as December 2012, depending on the turbine and construction company selected. Initial site preparations, including access roads and turbine foundations, would commence as early as 2011 with the turbine erection and balance of plant construction occurring in 2012. The peak number of construction workers is estimated to be 80 with an estimated minimum of 20 during active construction.

Certain components of the Project would require specialized labor that would be brought in from other counties or other states, such as high voltage work, turbine commissioning, and controls and instrumentation work. Highly specialized training of local labor for construction for certain activities is not warranted given the short duration of Project construction. However, it is likely that training of local labor for less specialized work would be evaluated and would likely be necessary for O&M during the life of the Project. It is anticipated that there may be up to 16 full-time personnel on-site to perform O&M services. Local skilled labor for the basic infrastructure and site development needs of the Project is likely available within the county or the state and would be utilized to the extent practicable.

There are no anticipated impacts on permanent housing. Imported laborers would require temporary lodging. It is likely that imported laborers would use lodging facilities in either Ashley or Wishek. Some limited permanent housing accommodations for specialized labor necessary during the life of the Project would also be required for the permanent O&M staff at site, which may be up to 16 personnel for the life of the Project. These accommodations would likely be found in close proximity to the Project Area such as the town of Lehr. Unoccupied residences in towns such as Lehr would likely be rented or purchased, providing additional revenue to these areas. Additionally, permanent O&M workers may construct new residences in these towns bringing in additional work for local contractors and additional income to the tax base. Lease payments would provide farmers with supplemental income.

It is anticipated that no prime farmland and 0.5 acre of farmland of statewide importance would be permanently disturbed from operation of the Project according to the proposed layout. This impact is considered negligible when compared to the agricultural production of the rest of the county. During construction and operations, CPV would reimburse landowners for damaged crops as specified in the Easement Agreement between CPV and the landowner.

The Project would permanently impact approximately 73 acres of the total Project Area as a result of the construction of Project facilities (Table 2-1), including turbine sites, access roads, an O&M building, permanent met towers, and a substation. Construction of these facilities would not cause additional impacts on the industry of the area. In general, landowners would be able to continue to use their property for agricultural or other purposes around turbine locations. Landowners will be consulted, as needed, to minimize impacts further on prime farmland and other productive farmland areas during final micrositing.

Studies on the effects of wind energy projects on property values have not found evidence to suggest that wind projects have a negative impact on property values. A 2009 study from the Lawrence Berkeley National Laboratory (Hoen et al. 2009) found that the view and/or distance from homes of a wind facility do not have a statistically significant effect on sale prices. For this study, 24 wind facilities in nine states were analyzed with 7,429 sale transactions in the area, including 125 properties within 1 mi of a project. The transactions were analyzed by distance of turbines, timing of the home sale in relation to the public notice of the wind facility, and view. Other data concerning the locations of the transactions such as area amenities were also recorded during the three-year study. The results determined that while impacts on home sales could exist, those impacts are either too small and/or infrequent to result in a widespread, statistically observable effect.

The Renewable Energy Policy Project (REPP) also conducted a comprehensive study of U.S. projects in 2003 (Sterzinger et al. 2003). Based on three different analyses of real estate transactions within 5 mi of the 10 wind energy projects included in the study (i.e., property value trends throughout the entire study period, trends before and after construction of the wind energy project, and comparison of property value trends with comparable control communities), the REPP study concluded that there is no statistical evidence to suggest that wind farms have a negative effect on property values.

Cumulative Effects

The revenue generated from expenditures and lease and tax payments from this Project and others in surrounding counties would have a positive cumulative effect on the regional

and state economy. The development of the Project may contribute to the development of wind-related businesses in the area, such as specialized O&M companies. A study conducted at the Langdon Wind Energy Center located in Cavalier County, North Dakota estimated that the North Dakota economy received more than $225 million from construction of that project (Leistritz and Coon 2008).

4.10.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built, and lease payments to landowners and tax payments to the County would not occur. As a result, the economic benefits associated with the construction and operation of the proposed Project would not occur.

Cumulative Effects
Under the No Action Alternative, the regional and state economies would still benefit from other wind energy projects in surrounding counties; however, the additional revenues from the Project would not occur and the local benefit to landowners and McIntosh from lease and tax payments would not occur.

4.11. Transportation

4.11.1. Proposed Action

Roads
The Project would include approximately 32.5 mi of new gravel access roads. Both the new and existing roads would average approximately 36 ft, and in some instances up to 50-ft wide, during construction, with low vertical relief to allow cross-travel by farm equipment. This improved and expanded transportation network would be used by construction vehicles during Project construction, and O&M crews inspecting and servicing the wind turbines during Project operation. The access roads would be sited between towers, with one road typically required for each string of turbines. Roads would be reduced to approximately 16 ft wide during operation and shoulders reseeded. Landowners will continue to be consulted in order to microsite access roads in a manner that preserves existing land uses to the greatest extent practicable.

Construction of roads would be conducted in conformance with applicable state laws and the Road Use and Maintenance Agreement (road agreement) with McIntosh County. All required state permits to ensure that road construction or widening is in conformance with applicable regulations and minimizes adverse impacts will be obtained. Turbine setbacks equal to 1.1 times the turbine blade tip height from the center of county, state, and federal road right-of-ways will be implemented to minimize potential for impacts.

Traffic
Traffic impacts from the Project would be greatest during Project construction. Impacts may be most noticeable on the local county and township roads within the Project Area, which have particularly low existing traffic use. CPV estimates a total of approximately 22,000 round trips for construction personnel to commute to and from the Project during the construction period, with daily traffic varying upon the staffing level at the site and the specific construction activity and estimated 60 maximum daily round trips at the peak of the Project effort. However, based on the existing traffic use and the rural nature of the area, the impacts from the additional construction-related traffic are expected to be minimal. Any

impacts on county roads would be addressed in accordance with the road agreement with McIntosh County.

Trucks would likely access the Project Area from State Highways 11, 13, or 30; this would vary depending on the truck source and delivery destination. For delivery of large components on trucks to the Project, it is estimated that during construction this will require approximately 1,200loads for wind turbine components, approximately 400 loads for contractor equipment (accounting for equipment hauled in and out after use), and approximately 8,700 loads for materials. State and local road officials would be contacted prior to Project construction to discuss potential road reconstruction projects that may overlap with Project construction. Operating permits (i.e., oversize or overweight, utility permits, and right-of-way permits) would be acquired from the state, county, and/or township, as necessary.

No overhead transmission lines are proposed for the Project, therefore no transmission line crossings of highways of utility permits would be required. No work within NDDOT right-of-ways is proposed.

The NDDOT has informed TVA that Highway 13 (Figure 3-8) between Wishek and Lehr is scheduled for reconstruction during 2011 and 2012 which may temporarily prevent movement of over-dimensional loads on this thoroughfare. The Developer would work with the NDDOT to ensure Project traffic is coordinated with this reconstruction effort. Should the need arise, relatively minor adjustments to delivery routes and employee commutes would generally involve equivalent state and local roads for these alternative routings If alternative routes are needed for a portion of the construction period, minor effects similar to those described for the planned routes, would occur.

Air Traffic

Aviation Systems, Inc. conducted a desktop evaluation of the Project from the perspectives of air traffic and aviation (Appendix K). The results of that September 2009 evaluation were used to develop a Project Area at a sufficient distance from local airports such that no impacts on air traffic are expected (Figure 3-8). In accordance with Federal Aviation Regulations (FAR), Part 77, a Notice of Proposed Construction or Alteration to the FAA has been submitted for each turbine location. The FAA issued a “Determination Of No Hazard To Air Navigation” with respect to all turbines proposed for the Project on February 24, 2010 (Appendix L).

Cumulative Effects

The limited and short-term nature of the use of existing roads during construction would not contribute noticeably to the cumulative effects. The state and county roads that would be used for this Project are carrying traffic at a fraction of their capacities and would therefore be able to accommodate the additional vehicles required for construction and operation of the Project safely and no loss in Level of Service. Turbine access roads would not be available for public access so there would not be any cumulative effects on transportation from the access roads. No other wind energy project in the area is known to have potential turbine delivery dates overlapping those of the Project. The projected in-service schedules and availability of non-overlapping access routes for other wind projects indicate that the potential for a cumulatively significant or negative effect on traffic patterns or local road use by others would be minimal.

4.11.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, transportation impacts from construction, operation, and maintenance associated with the Proposed Action would not occur.

Cumulative Effects
There would be no cumulative effects on transportation as a result of the No Action Alternative.

4.12. Communication Resources

4.12.1. Proposed Action

Prior to Project construction, underground telephone and fiber optic cables would be located by the respective utility companies or an underground utilities locator company. To the extent Project facilities cross or otherwise affect existing telephone or fiber optic lines or equipment, CPV will coordinate with service providers so as to avoid interference with their facilities. Negative impacts on these buried telecommunications cables would therefore be avoided.

Available information indicates that there are no licensed operating AM/FM stations within a 15 mi search radius of the Project. Off-air television coverage in the Project Area includes very limited programming from two stations. Because off-air programming is so limited, it is likely that local residents supplement their television service with either cable or direct satellite broadcast, neither of which would be affected by wind turbines or other Project components.

Impacts to the one non-federal government microwave beam path that crosses the Project Area have been mitigated by avoiding the path's Worst Case Fresnel Zone (WCFZ), which is approximately 27.9 m (91.5 ft) in width along either side of the centerline of the microwave beam path. Turbines and other Project components have been located outside of the WCFZ to minimize interference (Figure 2-3).

Although one LMR is located approximately 1 mi south of the Project Area, very little, if any, impact to the coverage of the repeaters would occur once the turbines are installed. In the unlikely event that there is a reported change in coverage attributable to the Project, it could be corrected by repositioning or adding repeaters that operate with the LMR system mobile units. Also, repeater antennas could be installed on utility, meteorological or turbine towers in the wind facility if needed.

Cumulative Effects
The potential for effects to communications is a localized phenomenon and are assessed for wind projects on an individual basis. This characteristic, the typical siting consideration given to interference with microwave beam paths (when appropriate), and the low availability of off-air television and lack of AM/FM radio stations near the CPA Ashley and the other identified wind projects indicate a low potential for effects to communications resources, either individually or cumulatively. There would be no impacts on communication resources from the Project and therefore, there would be no cumulative impacts.

4.12.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, communication resources impacts from construction, operation, and maintenance associated with the Proposed Action would not occur.

Cumulative Effects
There would be no cumulative effects on communication resources as a result of the No Action Alternative.

4.13. Public Safety

4.13.1. Proposed Action

Electromagnetic Fields
The general scientific consensus is that electric fields pose no risk to humans. However, the relationship between magnetic fields and biological responses or health effects remains a subject of research and debate (National Institute of Environmental Health Sciences EMF-RAPID Program Staff 1999). EMFs would be associated with Project components, including turbines, collection lines, and the Project substation. Turbines would be no closer than 1,400 feet to occupied residences and the burial of the collection lines would be approximately 4 ft below ground, both of which will minimize exposure to EMFs beyond background levels. Fencing and warning signs will be placed around the Project substation.

Hazardous Materials / Hazardous Waste
The Project would require the use of petroleum products, primarily including fluids with associated turbines and substation/transformer equipment. Each turbine would use three types of fluids derived from petroleum during operation: gear box oil, hydraulic fluid, and gear grease. Transformers would contain mineral oil. Heavy machinery used during Project construction would also use minor amounts of hydraulic fluid. Impacts include the potential for spills, leaks, and contamination from these sources if improperly stored and used. Use of USEPA-approved pesticides or herbicides would be limited to the extent necessary during Project operations.

A Phase I ESA, conducted in conformance with the ASTM standard, will be used to minimize risk associated with any potentially existing RECs that may pose a threat to human health and safety. Any petroleum waste generated will be handled and disposed of in accordance with local, state, and federal regulations. Chemicals for Project activities will be stored in covered containers in a designated area. Pesticides or herbicides use will be limited in conjunction with Project construction or operation. Additional handling, storage, and reporting requirements for any minor amounts of hazardous material (none is anticipated) will be covered as required in association with the NDPDES permit application and SWPPP.

Security
CPV will follow security measures in order to reduce the chance of damage to physical property and personal injury, including:

- Siting of wind turbines away from potential receptors such as occupied residences and the centers of road right-of-way, using setbacks of 1,400 ft and 1.1 times turbine tip height, respectively.

These setback distances are considered appropriate based on developer experience and examples set by other wind projects in North Dakota. These distances will also serve to mitigate EMF levels (as discussed above), as well as sound.

- Use of temporary and permanent precautions during construction and operation, such as safety fences, warning signs, and locks on equipment and wind power facilities.

- For most turbines, all associated electrical equipment, with the exception of the pad-mounted transformers, will be contained within the solid steel enclosed tubular towers on which the turbines are mounted. Access to the tower will be restricted to a single solid steel door to be locked when not in use. The Project substation will have applicable warning signs and will be fenced and locked.

With the use of wind turbine setbacks and temporary and permanent precautions during construction and operation, such as safety fences, warning signs, and locks on equipment and wind power facilities, Project construction and operation would have minimal impacts on the security and safety of the local communities.

Cumulative Effects
Development of the proposed Project and other existing or reasonably foreseeable future wind energy facilities is expected to have minimal effect on public safety. As noted, the incremental effects of the Project on EMFs, hazardous wastes, and security are likely to be very minor. In consideration of the extent of these incremental impacts, their localized nature, and the distance between the Project and other wind energy facilities, cumulative effects are anticipated to be negligible.

4.13.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built. As a result, no potential impacts to public safety would occur.

Cumulative Effects
As noted, the No Action Alternative would have no impact on public safety; therefore, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no cumulative effects to public safety would occur.

4.14. Public Services

4.14.1. Proposed Action

The Project is expected to have a minimal effect on the existing services and infrastructure in and nearby the Project Area. Construction and operation of the Project will be conducted in accordance with all associated local, state, and federal permits and applicable regulations and industry standards(e.g., FAA requirements). The following is a brief description of the impacts that may occur during construction and operation of the Project.

Local Services
No material impacts on local services such as hospital, fire, and police are expected as the Project is relatively self-sufficient with respect to consumables and services. However, CPV

will coordinate with local fire, police, and hospital facilities prior to construction and operation of the Project to ensure appropriate access and response to emergencies.

The number of full-time employees at the Project is expected to be of a small enough number to benefit the tax base without having a detrimental impact on the ability of existing services (e.g., schools) to maintain the current level of service. The Project would utilize subcontractor services where such services are outside the routine capability of the plant staff, and such services would likely be of a specialized nature so as not to have an impact on the local community. However, where such local skills and services are available, those services would likely be utilized by the Project on an as-needed basis resulting in a beneficial impact on the local community.

Electrical Service
The Project would require electrical service from the local provider during the construction period and may also require electrical service during brief, infrequent operational periods (<10 %)when the no turbines are generating electricity. In order to prevent adverse effects to the existing electrical transmission system, CPV will comply with applicable NERC and MISO regulations and any requirements of their Interconnection Agreement, which specifically address electrical service. CPV will also use a turbine setback equal to 1.1 times the turbine blade tip height from existing transmission lines when siting wind turbines. No adverse long-term or significant impacts on the local rural electrical service are expected as the incremental requirements of the Project are minimal.

Water Supply
Construction and operation of the Project would not significantly impact the water supply or quality of the area due to the relatively low water use, distance to farmstead wells, and depths of turbine and building foundations . The current layout of project facilities would not be sited near existing wells due to the fact that they are typically sited in close proximity to the homesteads or farmsteads they serve, and turbines would not be sited within 1,400 ft of occupied residences. The Project would not require the abandonment of any wells, the appropriation of surface water, or permanent dewatering. Temporary dewatering of groundwater may be required during construction of turbine foundations and water would also be used at batch plants. Any temporary dewatering of groundwater during Project construction will be conducted under the requirements of the NDPDES permit and SWPPP. It is likely that the Project would require a single domestic-sized well for the O&M facility with additional water required for blade washing and on-site fugitive dust control . Refer to Chapter 3.2 for detailed discussion of groundwater resources. The presence of wells at homesteads in the region which are able to access shallow aquifers in the surrounding area indicates that groundwater resources in the area are sufficient to support the domestic-sized withdrawal needed for the Project without detrimentally affecting other groundwater users in the area.

Cumulative Effects
Based on the small incremental effects of the Project on public services, and the distance to other existing or reasonably foreseeable wind energy facilities, no cumulative effects to public services are expected.

4.14.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built, and no impacts to public services would occur.

Cumulative Effects
Because the No Action Alternative would have no impact on public services, no incremental effects would be added to past, present, or reasonably foreseeable future actions, and no cumulative effects would occur.

4.15. Environmental Justice

4.15.1. Proposed Action

Neither the Project Area nor McIntosh County has a concentrated population of minority or low-income families. Additionally, the Project would not have "disproportionately high and adverse human health or environmental effects on minority populations and low-income populations in the United States." Therefore, the Project would not disproportionately affect low-income or minority populations and would satisfy Executive Order 12898.

Cumulative Effects
There would be no impacts on minority or low-income populations from the Project and therefore, there would be no cumulative impacts.

4.15.2. No Action Alternative

There would be no environmental justice impacts from the No Action Alternative.

Cumulative Effects
There would be no cumulative impacts on environmental justice as a result of the No Action Alternative.

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CHAPTER 5

5.0 SUMMARY OF COMMITMENTS AND MITIGATION MEASURES

The following commitments including conservation measures, as well as mitigation measures would be implemented in the event that TVA chooses the Action Alternative. As appropriate, these measures would be implemented by TVA and/or CPV Ashley (The Developer) under the contingencies identified below.

As discussed in Section 2.1.2 of this EA, many impacts have been preemptively avoided, reduced or mitigated through:

- Measures developed in the iterative development process described in Chapter 2 and incorporated directly into the proposed siting, design and engineering features of the Project; and

- Standard industry best management practices.

Those features, measures and best management practices, many of which are environmentally important, are reflected in the proposed project design construction and operation described in Chapter 2, and as such are not reiterated here. Additional measures include the following items.

5.1. Geology, Topography and Soils

5.1.1. Geology, Topography and Soils

- Where gravel extraction operations are identified in the Project Area, wind turbines and other Project components have been be microsited to avoid impacts. No other mitigation is anticipated to be necessary.

- Through the design and engineering process, the Developer has worked to reduce the temporary and permanent Project footprint (Section 2.1.2) in order to minimize the physical impacts (particularly to soils, water and biological resources) of the Project, as well as described the general best management practices which will be employed. However, small quantities of waste sediment which may be generated during excavation of turbine foundations would be disposed of on-site, not in proximity to surface waters or wetlands.

5.2. Water Resources

5.2.1. Surface Waters, Floodplains and Wetlands

None identified for surface waters or floodplains, other than as incorporated in project design and best management practices described in Section 2.1.2. Because anticipated wetland impacts are so small because of project design and the best management practices identified in Section 2.1.2, mitigation is not planned specifically to offset minor

effects on wetlands. However, commitments and measures under development through the Section 7 consultation process with the USFWS would substantively and beneficially affect wetlands through conservation measures proposed for whooping crane habitat.

5.2.2. Groundwater

- In the event that subsurface blasting is required (unlikely), a blasting plan would be developed and implemented to keep the impacts localized and fracture the least amount of bedrock necessary for construction.

- Any dewatering required during construction would be discharged to the surrounding surface, thereby allowing it to infiltrate back into the ground to minimize potential for off-site impacts.

5.3. Biological Resources

5.3.1. Vegetation

In terms of mitigative measures, the Developer would:

- Reseed disturbed areas with native material following completion of construction activities;

- Develop a management plan to prevent the spread of noxious weeds throughout the Project or adjacent areas during construction and ongoing operations, in accordance with state and county regulations. North Dakota law (NDCC § 63-01.1-01) requires North Dakota landowners and other persons in charge of or in possession of land to eradicate or control the spread of noxious weeds. Compliance with preventative best management practices during construction will minimize the potential for the spread of weeds within the Project Area;

- Work closely with the USFWS and NDGFD to continue to minimize impacts on vegetation within the Project Area during micrositing; particularly (if needed as an unanticipated result of final micrositing) to avoid impacts on USFWS WPA and to avoid or minimize any impacts on wetlands and native prairie within USFWS easements.

- As also described in Section 2.1.2, CPV will use BMPs during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, stabilizing restored material, and re-seeding rangelands with native species.

5.3.2. Wildlife

In terms of mitigative measures, the Developer would:

- Minimize permanent impacts on wetlands during design and construction of turbines and associated infrastructure. This would help minimize wildlife impacts (e.g., waterfowl, waterbirds, bats);

- Minimize disturbance of native prairie through project design (Section 2.1.2) and the measures indicated above for vegetation;

- Protect existing trees and shrubs where practicable. If impacts are unavoidable, CPV will consult with the landowner regarding the replanting of trees;

- Re-seed impacted non-cropland and pasture areas with a native seeding mix as recommended by USFWS and NRCS;

- Control noxious weeds in the immediate vicinity of the turbines, access roads, and associated facilities, immediately after construction and periodically for the life of the Project;

- Bury the electrical collection system connecting the turbines to the Project substation underground, if site conditions are favorable;

- Implement an Avian and Bat Protection Plan (ABPP) that will be developed in conjunction with TVA and the USFWS. This ABPP would include post-construction monitoring strategies, personnel training, the development of a Wildlife Response and Reporting System, and an adaptive management strategy;

- Establish a vehicular speed limit on Project roads; and

- Setback turbines, substations, and buildings at least 0.25 mi from USFWS WPAs.

- In the ongoing consultation with the USFWS under Section 7 of the ESA, CPV has committed to multi-year post-construction monitoring. As noted above, CPV has committed to the minimization of habitat fragmentation regarding reduction of impacts to native prairie. Additionally, CPV has chosen to erect free-standing permanent met towers in an effort to mitigate wildlife impacts.

5.3.3. Rare, Threatened, and Endangered

In addition the measures discussed above, the Developer would:

- Maintain a minimum of 0.5-mi setback from piping plover Designated Critical Habitat for Project facilities; and,

- CPV will perform all commitments developed under the Section 7 consultation between CPV, TVA and the U. S. Fish and Wildlife Service, as identified in the final Biological Opinion of the Service. This document will be attached as an Appendix to the final environmental document and the measures identified therein included in this chapter (5.0 Commitments and Mitigation Measures) of the final environmental document. Beyond the avoidance measures identified in the discussions associated with siting the Project (Section 2.1.2); as well as those for rare, threatened and endangered species (Section 4.3.1) and wetlands (Section 4.2.1), current additional measures in consultation discussions include obtaining property and or easements as conservation measures for whooping crane, piping plover, native grass and wetland habitats; and multi-year post-construction monitoring of avian wildlife resources.

5.4. Cultural Resources

TVA is consulting with the North Dakota SHPO regarding five archaeological sites that potentially meet NRHP criteria for eligibility. Avoidance and mitigation measures will be identified in the Final EA and the pertinent correspondence included in the appendices at the conclusion of consultation between TVA, SHPO and interested federally recognized tribes as proscribed as part of the Section 106 consultation process.

CPV will take steps to reduce impacts on potentially significant cultural resources in the APE through the following efforts:

- Project designs avoid construction around ponds and stream drainages to the extent practicable where prehistoric and historic sites may be located;
- Mapped historic structures would be avoided to reduce impacts on potential archaeological sites, architectural resources, and possible unmarked graves;
- All marked cemeteries and recorded archaeological sites would be avoided during Project planning (Figure 3-4);
- Project setbacks from extant roads and occupied buildings would have the added benefit of reducing impacts on some historic period archaeological sites and architectural resources, if present; and
- An Unanticipated Discoveries Plan has been developed which describes a plan and procedures to be followed if archaeological sites and/or human remains are unexpectedly encountered during Project construction and/or operation (Tetra Tech 2010i).

- If effects cannot be avoided through Project design modification, CPV in consultation with the ND SHPO, federally recognized tribes and TVA, would develop specific treatment plans or other alternative mitigation to address effects to NRHP-eligible archaeological sites, TCPs, or historic architectural resources. CPV would implement the treatment or mitigation measures agreed upon through consultation with TVA, SHPO, and federally recognized tribes.

5.5. Land Use

- To reduce potential impacts on occupied residences, turbines would be installed a minimum of 1,400 ft from occupied residences.

- CPV will work with Project landowners and the FSA to have affected CRP lands (up to approximately 25 acres) removed from the program, if necessary, and through landowners would provide compensation to the FSA for any reduction in CRP lands.

- CPV is committed to continue working with landowners during the final micro-siting of the Project facilities to minimize land use disruptions.

5.6. Recreational Resources

- Wind turbines, substations, and O&M buildings would be sited at least 0.25 mi from nearby WPAs in order to mitigate direct, physical impacts preemptively to recreational resources within and adjacent to the Project Area.

5.7. Visual Resources

- The setback of at least 1,400 ft from occupied residences will act as a mitigation measure to minimize potential adverse shadow flicker impacts.

- Should the need be identified, CPV will consider and work with individual landowners to assess need for additional measures such as strategic vegetative screening at affected occupied residences and/or installation of curtains and blinds on the windows facing the turbine casting the shadows.

5.8. Noise

- CPV will mitigate sound impacts from the Project through setback distances employed for wind turbines. The setback of at least 1,400 ft from occupied residences minimizes the potential for adverse sound impacts at NSAs.

5.9. Air Quality and Climate Change

- As appropriate, localized effects to air quality caused by creation of *de minimus* amounts of fugitive dust would be further reduced and controlled with implementation of standard environmental protection measures (reduced vehicle speeds, watering and dust suppression, etc.),

5.10. Socioeconomics

- Because of the beneficial nature of the Project and its minimal effects to social services and infrastructure, no specific socioeconomic mitigation is proposed.

- Landowners will be consulted, as needed, to minimize impacts further on prime farmland and other productive farmland areas during final micrositing.

5.11. Transportation

- Landowners will continue to be consulted in order to microsite access roads in a manner that preserves existing land uses to the greatest extent practicable.

- All required state permits to ensure that road construction or widening is in conformance with applicable regulations and minimizes adverse impacts will be obtained.

- A road use agreement with McIntosh County to address the utilization of county roads during construction of the Project has already been executed by CPV.

- Turbine setbacks equal to 1.1 times the turbine blade tip height from the center of county, state, and federal road right-of-ways will be implemented to minimize impacts.

- The Developer will coordinate with the McIntosh County regarding county road use during construction, as outlined to in the road use agreement and obtain all necessary oversized and haul permits from the NDDOT prior to construction.

5.12. Communication Resources

- Prior to Project construction, underground telephone and fiber optic cables would be located by the respective utility companies or an underground utilities locator company. To the extent Project facilities cross or otherwise affect existing telephone or fiber optic lines or equipment, CPV will coordinate with service providers so as to avoid interference with their facilities.

- Because impacts on AM, FM, and off-air television broadcasts are expected to be minimal, and any potential effects to the single microwave beam crossing the Project area preemptively avoided in siting, mitigative measures are, therefore, not proposed.

5.13. Public Safety

The following measures will be implemented to ensure public safety.

- PV will set back wind turbines from all occupied residences at least 1,400 ft, bury collection lines to a depth of approximately 4 ft, and fence off and place warning signs around the Project substation.

- A Phase I ESA, conducted in conformance with the ASTM standard, will be used to minimize risk associated with any potentially existing RECs that may pose a threat to human health and safety.

- Any petroleum waste generated will be handled and disposed of in accordance with local, state, and federal regulations. Chemicals for Project activities will be stored in covered containers in a designated area. Pesticides or herbicides use will be limited in conjunction with Project construction or operation. Additional handling, storage, and reporting requirements for any minor amounts of hazardous material (none is anticipated) will be covered as required in association with the NDPDES permit application and SWPPP.

CPV will follow security measures in order to reduce the chance of damage to physical property and personal injury, including:

- Siting of wind turbines away from potential receptors such as occupied residences and the centers of road right-of-way, using setbacks of 1,400 ft and 1.1 times turbine tip height, respectively. These setback distances are considered appropriate based on developer experience and examples set by other wind projects in North Dakota. These distances will also serve to mitigate EMF levels (as discussed above), as well as sound.

- Use of temporary and permanent precautions during construction and operation, such as safety fences, warning signs, and locks on equipment and wind power facilities.

- For most turbines, all associated electrical equipment, with the exception of the pad-mounted transformers, will be contained within the solid steel enclosed tubular towers on which the turbines are mounted. Access to the tower will be restricted to a

single solid steel door to be locked when not in use. The Project substation will have applicable warning signs and will be fenced and locked.

5.14. Public Services

The following measures will be implemented to protect public services.

- Construction and operation of the Project will be conducted in accordance with all associated local, state, and federal permits and applicable regulations and industry standards(e.g., FAA requirements).

- CPV will coordinate with local fire, police, and hospital facilities prior to construction and operation of the Project to ensure appropriate access and response to emergencies.

- In order to prevent adverse effects to the existing electrical transmission system, CPV will comply with applicable NERC and MISO regulations and any requirements of their Interconnection Agreement, which specifically address electrical service. CPV will also use a turbine setback equal to 1.1 times the turbine blade tip height from existing transmission lines when siting wind turbines.

- Any temporary dewatering of groundwater during Project construction will be conducted under the requirements of the NDPDES permit and SWPPP.

5.15. Environmental Justice

As no disproportionate impacts to minority or disadvantaged populations are anticipated, no mitigation measures are proposed for environmental justice.

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CHAPTER 6

6.0 LIST OF PREPARERS

Table 6-1 summarizes the expertise and contribution made to the Draft EA by the Project Team.

Table 6-1. Environmental Project Team

TVA

Name and Title	Contribution and Expertise
BRUCE YEAGER NEPA Program Manager TVA	NEPA Compliance and NEPA Project Management , Document Reviewer M.S. and B.S. Zoology 34 years environmental policy, analyses, and assessment
JOHN BAXTER. Specialist Aquatic Endangered Species	Reviewer Ecology and Listed Federal Specie M.S. and B.S., Zoology 23 years in Protected Aquatic Species Monitoring, Habitat Assessment, and Recovery; 13 years in Environmental Review
PATRICIA EZZELL Manager Native American Liaison, TVA	Conducted and Coordinate Native American Tribal Consultations M.A., History with an emphasis in Historic Preservation; B.A., Honors History 26 years in History, Historic Preservation, and Cultural Resource Management; 8 years in tribal relations
HOLLY LE GRAND Zoologist TVA	Reviewer Terrestrial Ecology and Habitat M.S., Wildlife; B.S., Biology 9 years in Biological Surveys, Natural Resource Management,
TRAVIS HENRY Wildlife Biologist TVA	Reviewer Terrestrial Animals and Habitat M.S., Zoology; B.S., Wildlife Biology 24 years in Zoology and Endangered Species; 17 years in NEPA Compliance
PEGGY SHUTE Endangered Species Compliance Officer TVA	Conducted Endangered Species Act Compliance Consultation and Reviewer M.S., Zoology; B.S., Biology 23 years in Environmental Impact Assessment for Endangered Species; 28 years Endangered Aquatic Species
RICHARD YARNELL Archaeologist TVA	Conducted SHPO Coordination and Reviewer Cultural Resources B.S., Environmental Health 39 years, Cultural Resource Management
KIM PILARSKI Senior Wetlands Biologist TVA	Wetlands reviewer. M.S., Geography, Minor Ecology 17 years experience in wetlands assessment and delineation
ARIANNE BALSOM Contract NEPA Specialist TVA	NEPA Compliance, Document Reviewer and Editor M.S. and B.S., Ecology and Evolutionary Biology 9 years in Biodiversity, Invasive Species, and Water Quality; 7 years in Geographic Information Systems; 5 years in Climate Change, Microbiology, and Environmental Chemistry; 2 years in Land Management and Water Quality, Technical Writing, and Editing; 3 years in NEPA Compliance

CPV and Tetra Tech

Name and Title	Contribution and Expertise
JOHN HAFNER Manager Competitive Power Ventures, Inc.	John Hafner has been a member of CPV since 2007 and has been directly involved in the Project since its inception. John is responsible for general oversight on this Project. He is also CPV's representative in the development of a Bi-regional Whooping Crane Habitat Conservation Plan.

Name and Title	Contribution and Expertise
GENER GOTIANGCO, P.E. Vice President Competitive Power Ventures, Inc.	Gener Gotiangco has been with CPV since 2005 and has 21 years of experience in all phases of thermal and renewable project development, construction, and operations and has responsibility for operations of the Project.
JOHN MURPHY Senior Vice President Construction Competitive Power Ventures, Inc.	John Murphy has 25 years of experience managing the successful installations of power plants throughout the United States and will have overall responsibility for construction of the Project.
SEAN FINNERTY Senior Vice President Renewable Development Competitive Power Ventures, Inc.	Sean Finnerty has over 15 years of experience in energy project development and has been a member of CPV since its inception and has taken a variety of leadership roles for the Company including project development, marketing, portfolio acquisitions, and asset management. Currently, Sean is responsible for all aspects of the Company's renewable energies program including operation of CPV Renewable Energy Company and the Ashley Wind Energy Project. He serves as the Project's officer, providing strategic direction, overseeing the Project developers, and leading all major commercial negotiations.
ROBERT BURKE General Counsel Competitive Power Ventures, Inc.	Robert Burke has over 20 years of experience representing energy companies in the United States and abroad in numerous contexts, including complex project developments, acquisitions, operations, regulatory matters and financings. As General Counsel, Robert oversees the legal representation of the Company, including its compliance program, and participates in the broad spectrum of the Company's project development activities.
ERIKA ROBERTS Project Manager Tetra Tech EC, Inc.	Erika Roberts has over 10 years of experience in the environmental consulting field and works directly with clients, subcontractors, state and federal agencies, and local communities in the preparation of environmental studies and permit application submittals. She is responsible for overseeing the Tetra Tech team and provides comprehensive environmental studies and permitting support for this Project.
JASON JONES, PH.D. Senior Ecologist Tetra Tech EC, Inc.	Dr. Jason Jones has over 17 years experience in terrestrial ecology, with a focus on avian and forest ecology. He is the senior ecologist supporting the Project and has served as the task lead and senior reviewer of the 2009 Fall Avian Report (Appendix D), 2010 Spring Avian Report (Appendix D), 2010 Turbine Model Comparison for the Fall 2009 and Spring 2010 Avian Surveys (Appendix D), Native Prairie Survey (Appendix C), Bat Likelihood of Occurrence Report (Appendix E), Whooping Crane Likelihood of Occurrence Report (Appendix F), and wildlife chapters of this EA.
SYDNE MARSHALL, PH.D. Professional Archaeologist Tetra Tech EC, Inc.	Dr. Sydne Marshall has over 30 years experience in the investigation and management of cultural resources including archaeological and architectural properties. She serves as the Cultural Resources Discipline Lead, responsible for evaluating technical requirements of this project and assisting Erika Roberts in addressing cultural resources issues on this Project. She has served as the task lead and senior reviewer for the Class I Cultural Resources Investigation , Class II Architectural Reconnaissance Survey, Class III Archaeological Survey, Draft Unanticipated Discoveries Plan, and the cultural resources chapters for this EA.

Name and Title	Contribution and Expertise
STEPHANIE FRAZIER Wetland Ecologist Tetra Tech EC, Inc.	Stephanie Frazier has over 13 years of experience in aquatic and terrestrial methods including wetlands delineation, wetland functions and values assessment, USEPA's rapid bioassessment protocols for benthic macroinvertebrates, stream habitat assessments, freshwater and estuarine fish sampling and identification, breeding bird and migratory raptor surveys, vegetation identification and sampling, and experimental design. She served as the task lead and senior reviewer for the Delineation of Wetlands and Waters of the United States Report (Appendix B) and water resources and vegetation chapters of this EA.
ERIK KALAPINSKI Senior Sound and Vibration Consultant Tetra Tech EC, Inc.	Erik Kalapinski has over 14 years experience in transportation and stationary source impact assessments. For the past 10 years he has studied and evaluated wind turbine acoustics for projects ranging from the siting of a single demonstration wind turbine unit to full scale utility wind energy conversion projects. He was responsible for overseeing the noise analysis for this Project and served as senior reviewer for the Acoustic Assessment (Appendix I) and noise chapter of this EA.
TED GUERTIN Air Quality Analyst Tetra Tech EC, Inc.	Ted Guertin has over 18 years experience in environmental licensing, dispersion modeling, air toxic assessments, air permitting (including PSD), and air quality compliance monitoring, wind power related environmental assessments and wind resource assessments. More recently, Ted has conducted several wind power related assessments using the WindPro software including shadow flicker, zone of visual impact (ZVI), wind farm photo simulations, and initial wind resource evaluation. He conducted the analysis and authored the Shadow Flicker Impact Analysis (Appendix H) and the visual resources chapter of this EA.
JACK KLINE Meteorologist RAM Associates	Jack Kline has over 28 years of experience in micrositing, wind park annual energy projections, analysis of macro-scale wake effects, wind turbine performance analysis, wind park performance modeling, long-term wind speed modelling based on climatological indicators, wind park wake tests/analysis, turbulence research, and theoretical energy calculations. Jack served as the technical expert on performance modeling and micrositing for the Project.
COMSEARCH Spectrum Resources	COMSEARCH has over 30 years experience in spectrum resources management. For this Project, COMSEARCH provided a communications analysis that determined impacts to telecommunications in the vicinity of the Project (Appendix J).
ENVIRONMENTAL DATA RESOURCES INC. Environmental Risk Review	Environmental Data Resources Inc. has over 20 years experience in providing developers with environmental information services. They provided an environmental risk report for the Project. The report was references in Chapter 3.13.2 of this EA.
AVIATION SYSTEMS INC. Aviation Consultants	Aviation Systems Inc. has over 38 years of experience in providing client-centered, high quality consulting services and assistance on regulatory matters pertaining to aviation. They were responsible for reviewing the Project from an airspace and aviation perspective (Appendix K).
SCOTT GLAUBITZ, P.E., P.L.S. President B.S.E. Consultants, Inc.	Scott Glaubitz has over 27 years experience in designing and providing construction observation for civil engineering projects. He is licensed as a professional engineer in ten states. Scott is responsible for engineering overview on this Project.

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CHAPTER 7

7.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES ARE SENT

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CHAPTER 8

8.0 LITERATURE CITED

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