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FINAL ENVIRONMENTAL ASSESSMENT

CIMARRON WIND ENERGY PROJECT – PHASE 1

Gray County, Kansas

PREPARED FOR:
TENNESSEE VALLEY AUTHORITY

SUBMITTED BY:
CPV CIMARRON RENEWABLE ENERGY COMPANY, LLC

PREPARED BY:
TETRA TECH EC, INC.

NOVEMBER 2011

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AADT	Average Annual Daily Traffic
ABPP	Avian and Bat Protection Plan
AM	amplitude modulation
APE	area of potential effect
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AT&SFRR	Atchison, Topeka and Santa Fe Railroad
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BNSF	Burlington Northern and Santa Fe
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CPV or Developer	CPV Cimarron Renewable Energy Company, LLC
CPV REC	CPV Renewable Energy Company, LLC
CRP	Conservation Reserve Program
CWA	Clean Water Act
EA	environmental assessment
EDR	Environmental Data Resources, Inc.
EMF	electromagnetic fields
EIS	environmental impact statement
EO	Executive Order
EPC	engineering, procurement, and construction
ESA	Endangered Species Act or Environmental Site Assessment
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
FM	frequency modulation
FSA	Farm Service Agency
ft	feet
GAP	GAP Analysis Program
GE	General Electric
GHG	greenhouse gas
GIS	geographic information system
IRP	Integrated Resource Plan
KAR	Kansas Administrative Regulations
KCP&L	Kansas City Power & Light
KDA	Kansas Department of Agriculture
KDHE	Kansas Department of Health and Environment
KDOT	Kansas Department of Transportation
KDWPT	Kansas Department of Wildlife, Parks, and Tourism

KGS	Kansas Geological Survey
Km	kilometer
KNHI	Kansas Natural Heritage Inventory
KOS	Kansas Ornithological Society
kV	kilovolt
Lead Agency or TVA	Tennessee Valley Authority
LGIA	Large Generator Interconnection Agreement
LMR	Land Mobile Radio
m	meter
m^2	square meters
m/s	meters per second
MBTA	Migratory Bird Treaty Act
met	meteorological
MGD	million gallons per day
mi	mile
mi^2	square mile
MOA	Memorandum of Agreement
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NLCD	National Land Cover Dataset
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWR	National Weather Resource
O&M	operation and maintenance
Operator	entity hired to operate the constructed Project
PEM	palustrine emergent
PPA	power purchase agreement
Project	Cimarron Wind Energy Project – Phase 1
PSD	Prevention of Significant Deterioration
REC	recognized environmental condition
RECER	Renewable Energy and/or Clean Energy Resources
RFP	Request for Proposals
rpm	rotations per minute
RPS	renewable portfolio standards
RSA	rotor swept area
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Officer
Siemens	Siemens Energy, Inc.

SODAR	Sonic Detection And Ranging
SPP	Southwest Power Pool
SPT	standard penetration test
SSURGO	Soil Survey Geographic Database
Sunflower	Sunflower Electric Power Corporation
SWPPP	Storm Water Pollution Prevention Plan
Tetra Tech	Tetra Tech EC, Inc.
TVA or Lead Agency	Tennessee Valley Authority
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEIA	United States Energy Information Association
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound
WCFZ	Worst Case Fresnel Zone
WMA	wildlife management area

CHAPTER 1

1.0 PURPOSE 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 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 one to 20 years in duration.

Many of the proposals received were for wind energy sources of generation. From numerous proposals, CPV Cimarron Renewable Energy Company, LLC's (CPV or the Developer) Cimarron Wind Energy Project – Phase 1 (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 165 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

TVA is an instrumentality 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 (mi^2) region encompassing nearly all or portions of seven states and a population of about 9 million people. As of September 30, 2010, TVA's power system had a dependable summer generating capacity of 37,000 MW. Approximately 34,000 MW of the total capacity was provided by TVA facilities which generated 147 billion kilowatt hours in 2010. The remainder was purchased from non-TVA facilities under long-term power purchase agreements (PPAs) which resulted in TVAs total 2010 power distribution of 176 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 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), TVA would purchase up to 165 MW of renewable power under a 20-year 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 Gray County, Kansas. The Project Area is defined as the approximate 13,883 acres of private land under Easement Agreement with CPV for the Project as shown on Figure 1-1. The Project would interconnect to the Southwest Power Pool (SPP) electric grid via the existing on-site 345-kilovolt (kV) Sunflower Electric Power Corporation (Sunflower) transmission line that traverses the Project Area from east to west north of J Road, in Gray County.

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 *TVA's Environmental and Energy Future* (TVA 2011).

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

- Kansas Department of Health and Environment (KDHE)
  - National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Runoff from Construction Activities
  - Section 401 Water Quality Certification
- Kansas Department of Wildlife, Parks, and Tourism (KDWPT) – Consultation
- Kansas State Historical Society, State Historic Preservation Officer (SHPO) – Consultation

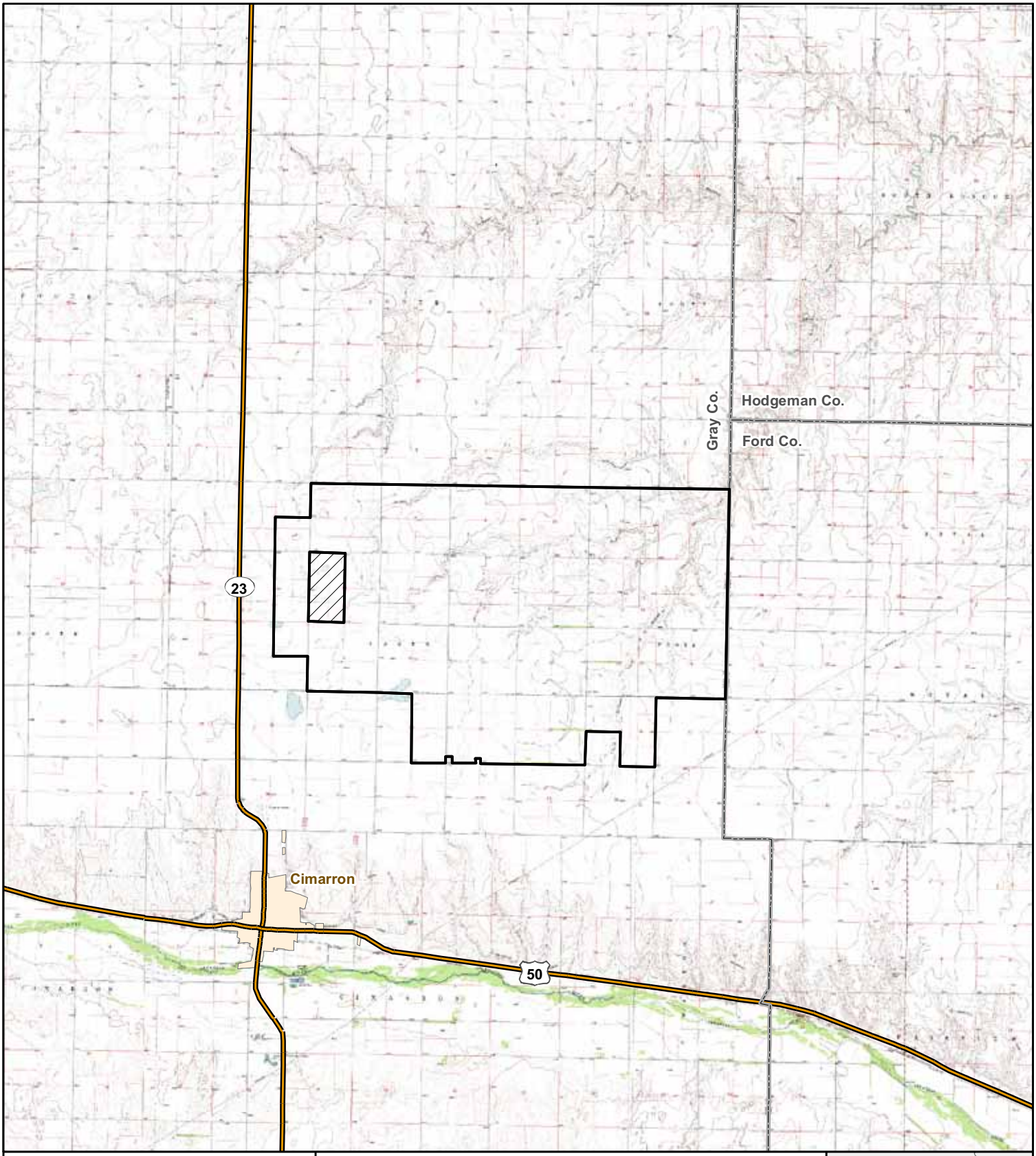

Figure 1-1
Project Area

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

Project Area
Non-Leased Area
City
Major Road
County Boundary

KANSAS
Project Location

N
0 1 2 Miles

Source:USGS 100k Quad, 1985.

CPV Renewable Energy Company, LLC
TETRA TECH EC, INC.

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- Kansas Department of Agriculture (KDA)
  - Consultation on Temporary or Term Water Appropriation Permit
  - Stream Obstruction Permit
- Kansas Department of Transportation (KDOT)
  - Utility Permit
  - Highway Permit
  - Overweight/Oversized Permit

The Project also would 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 1.4. The environmental studies completed by the Developer to date include:

- Delineation of Wetlands and Waters of the United States (report dated August 2011)
- Supplemental Delineation of Wetlands and Waters of the United States (report dated October 2011)
- Native Grassland Survey (report dated April 2010)
- Whooping Crane Likelihood of Occurrence Report (report dated November 2010)
- Bat Likelihood of Occurrence Report (report dated November 2010)
- 2010 Spring Avian Survey (report dated November 2010)
- 2010 Fall Avian Survey (report dated March 2011)
- Turbine Model Comparison for the 2010 Spring and Fall Avian Surveys (report dated July 2011)
- Phase I Reconnaissance Survey (report dated February 2011)
- Phase II Intensive Archaeological Survey (report dated August 2011)
- Supplemental Phase II Intensive Archaeological Survey (report dated October 2011)
- Historic Architecture Reconnaissance Survey (report dated February 2011)
- Supplemental Historic Architecture Reconnaissance Survey (report dated July 2011)
- Comsearch Telecommunications Studies (reports dated April 2008 and April 2010)
- Aviation Systems, Inc. Feasibility Evaluation (reports dated July 2007 and February 2011)

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 website at tva.gov or tva.com).

1.4. The Scoping Process

TVA initiated the scoping process by contacting interested government agencies and Native American Tribes during May and June 2010. TVA provided a summary of the proposed action on its website and invited agencies and the Native American Tribes to submit comments on the

scope of the environmental review and alternatives. On May 10, 2010, TVA mailed a copy of the Project description and Project Area map, complete with cover letter, to approximately 20 federal, state, and local agency officials (see Chapter 7.0 for a list of recipients). On June 30, 2010 the same material was mailed to the Native American Tribes requesting their comments. Over the next several months, TVA followed up with the United States Fish and Wildlife Service (USFWS), Kansas State Historical Society (which serves as the SHPO), and the Native American Tribes with additional correspondence and information. TVA received a total of eight comment letters, including three from federal agencies, four from state agencies, and one from a Tribal nation. The comments generally focused on concerns related to various resource areas and suggested mitigation measures, and also identified applicable laws, permits, and regulatory processes and provided suggestions for the scope of the environmental review. A copy of the written comment letters received during the scoping are included in Appendix A. Comments were used to determine the scope of review for the project and its potential to affect the environment, historic properties, or other issues associated with this effort.

TVA identified that an EA would be prepared to review the environmental issues for the proposed action. Based on internal scoping, identification of applicable laws, regulations, executive orders and policies, as well as the input received through the scoping process, TVA has identified the resources 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.

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 contacted 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)

- USFWS – Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), and Section 7 of the Endangered Species Act (ESA)
- Kansas SHPO and Federally Recognized Tribes – Section 106 of the National Historic Preservation Act (NHPA)
- Federal Aviation Administration (FAA) – Determination of No Hazard to Air Navigation
- The United States Environmental Protection Agency (USEPA) – Wetlands Executive Order (EO) 11990.

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

1.6. Public Notice of the Draft EA

TVA issued a draft EA on September 16, 2011 for public review and comment. Copies of the draft EA were mailed to government agencies as well as individuals who indicated an interest in the Project. TVA notified interested federally recognized Native American Tribes, elected officials, and other stakeholders that the draft EA was available for review and comment. Printed copies of the draft EA were made available to the public at libraries in Knoxville, Tennessee; and in Cimarron, Dodge City, and Topeka, Kansas. Electronic versions of the document were posted on the TVA website, where comments could be provided online. Also on September 21 and 22, 2011, public notices were published in the following local and regional newspapers soliciting comments from other agencies, the general public, and any interested organizations (Appendix B):

- Montezuma Press
- Topeka Capital-Journal
- Cimarron Jacksonian
- Dodge City Daily Globe
- Knoxville News Sentinel
- Garden City Telegram

The public comment period closed on October 17, 2011.

1.7. Public Comments on the Draft EA

TVA received four responses on the draft EA during the public comment period and one response afterwards (Appendix B). Substantive comments from those responses have been addressed in this final EA (Appendix B). The following is a summary of those public comments received.

In a September 26, 2011 letter the Natural Resources Conservation Service (NRCS) indicated that the proposed Project may convert farmland, as defined in the Farmland Protection Policy Act so an AD-1006 form is required. In a following October 27, 2011 e-mail the NRCS said they had concerns about routing the proposed collection lines through playa lakes and according to EO 11990, federal money should not be used to drain wetlands. The NRCS said that the lakes may be avoided through minor collection line route changes or other mitigation measures.

The National Oceanic and Atmospheric Administration (NOAA) determined, in a September 26, 2011 e-mail that they do not have any trust resources that would be affected by the subject purchase of renewable energy.

In an October 6, 2011 e-mail the KDA, Division of Water Resources said that potential concerns that they had earlier concerning stream crossings and stream obstruction permits, term permits for water supply needs during construction, and temporary displacement of agricultural lands were addressed in the draft EA.

The USFWS said in an October 17, 2011 letter that the measures in the draft EA for minimizing and avoiding impacts to migratory birds, including the endangered whooping crane, were insufficient. The USFWS would prefer that construction of wind farms wait until the Habitat Conservation Plan, which is being developed by the USFWS and wind turbine companies to guide the development of wind power within the migratory corridor of the whooping crane, is completed. The USFWS said a plan should be developed that offsets the stopover habitat loss for the whooping crane by targeting wetland areas outside the Project footprint for restoration or protection. The USFWS also provided power line construction and siting guidance to reduce their hazard to migrating whooping cranes. The USFWS will defer to any recommendations by the KDWPT for the protection of the lesser prairie-chicken. USFWS recommended that grassland mitigation be designed for this Project to replace habitat values lost to other bird species that nest in native grasslands.

CHAPTER 2

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter explains the rationale for identifying alternatives to be evaluated 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 purpose of and need for the proposed Action is to help meet TVA's renewable energy goal and to respond to future demand for electricity from the TVA power system. TVA's IRP (TVA 2011), from which this review tiers, considered a suite of alternatives to the proposed Action in this EA that would respond to the identified purpose and need.

In December 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

In addition to alternative technology alternatives addressed in the IRP EIS and the initial consideration of other RFP responses, there potentially are 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 was selected by the Developer 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. TVA has considered the Developer's evaluation process and believes it was adequate and appropriate.

The general vicinity of the Project Area was selected after an extensive search in Kansas 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 an on-site high voltage transmission line. 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 other than a short overhead line to interconnect the Project substation to the existing transmission line.

2.1.2. Siting Configuration and Actions Taken to Minimize Surface Disturbance

In developing the Project, the Developer has also considered alternative 165 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 early 2008 and has continued through review with TVA as well as through the current consultations with the USFWS, SHPO, and federally recognized Native American 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 other than a short overhead line to interconnect the Project substation to the existing transmission line that would run parallel to the existing 345-kV line.
- Providing setbacks from occupied structures to minimize potential sound impacts.
- Providing setbacks from existing county roads.
- Minimizing impacts to wetlands to the extent practicable.
- Providing setbacks from culturally sensitive areas.
- Providing setbacks from non-participating properties.
- Reducing impacts to native grassland habitats to the extent practicable.
- Utilizing the terrain efficiently.
- Avoiding aviation airspace constraints.
- 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, as provided for in the Easement Agreements CPV has with the underlying property owners. 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 Storm Water Pollution Prevention Plan (SWPPP). These measures would include best management practices (BMPs) for erosion and sediment control, such as temporary seeding, permanent seeding, mulching, filter strips, erosion blankets, and sod stabilization. If cuts are made during construction, top soil 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. 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 (Appendices C and D). However, the Developer would obtain a NWP if permanent impacts on CWA jurisdictional waters were unavoidable and less than 0.5 acre or an Individual Permit for unavoidable permanent wetlands impacts if the 0.5 acre threshold was exceeded. If applicable, 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.

If applicable, NWP-specific General and/or Regional Conditions prescribed for projects in Kansas 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 KDHE prior to construction of the Project.

Based on the results of the native grassland survey (Appendix E), Project micrositing has minimized impacts of the Proposed Action to native grassland from earlier potential configurations. Use of the USFWS' recommended practices during construction and operation would further minimize impacts to grasslands.

Impacts on the two microwave beam paths crossing the Project Area have been avoided through the siting of Project components outside of the Worst Case Fresnel Zone (WCFZ). Although not anticipated, impacts on Land Mobile Radio (LMR) could be mitigated, if necessary, by installing repeater antennas on meteorological (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 2007 and updated 2011 evaluations in developing a Project Area at a sufficient distance from local airports such that no impacts on air traffic are expected. 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 Project turbines on August 4, 2011.

Preliminary geotechnical investigations were performed to explore the general subsurface conditions in the Project Area to assist further with engineering design of the Project layout. Fifteen Standard Penetration Test (SPT) soil borings were drilled in the Project in September and October 2009 during initial due diligence efforts by the Developer and prior to TVA's federal nexus with the Project. Complete geotechnical investigations were completed for the Project in October 2011 under a Categorical Exclusion for Proposed TVA Actions dated September 23, 2011.

The Project Area was defined following this extensive screening effort 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 165 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 TVA involvement in the Project. If this alternative is chosen, CPV could decide to construct the Project anyway. However, the Project may not be economically viable without this existing PPA with TVA 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 165 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 SPP electric grid via the existing on-site 345-kV Sunflower transmission line that traverses the Project Area from east to west north of J Road, in Gray County. 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.

2.1.4.1. Project Area

The Project Area is located within Foote Township, an unincorporated area of northeastern Gray County, approximately 3 miles (mi) north of the City of Cimarron and 15 mi northwest of Dodge City. This location was proposed due to the wind resources of the area and the proximity to existing high voltage transmission lines, which give the Project access to the regional grid and reduces the amount of additional transmission needed to connect the site. The Project Area is approximately 13,883 acres of private land, primarily consisting of cultivated cropland (wheat and milo), with grasslands and scattered rural farms. The land is currently under easement to CPV. An existing Sunflower 345-kV transmission line traverses the Project Area along an east-west bearing north of J Road, in Gray County. Approximately 10 percent of the Project Area is Conservation Reserve Program (CRP) land; however, no wildlife preserves, parks, or sanctuaries are located within or near the Project Area. The Project Area is characterized by fairly level terrain, ranging from 2,670 feet (ft) in elevation along the eastern boundary to approximately 2,800 ft in elevation along the western boundary.

2.1.4.2. Project Layout

The Project would consist of up to 72 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; installation of a short-stretch of overhead line to connect to the substation; construction of an operation and maintenance (O&M) building; erection of up to three 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.

2.1.4.3. Wind Turbines

The Developer has identified three 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, SWT 2.3-108, 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 108 m in rotor diameter. Figure 2-2 provides a schematic illustrating the ranges of the dimensions of the three preferred wind turbine generators. Depending on the model selected, the Project could install up to 72 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-m rotor diameter. The rotor swept area (RSA) is approximately 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, 72 units would be constructed in rows running from southwest to northeast. 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.

Each Siemens SWT 2.3-108 turbine has a capacity of 2.3-MW, an 80-m hub height, and a 107.8-m rotor diameter. The RSA is approximately 9,126 m^2 and the rotor speed may range from 6 to 16 rpm. As with the SWT 2.3-101, 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 3-4 m/s and shutting down at or above the cut-out speed of 25 m/s. Rated power is achieved at approximately 11-12 m/s and the wind turbine would regulate to maintain the rated power. If this turbine is used at the proposed Project, 72 units would be constructed in rows running from southwest to northeast. 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.

Figure 2-1
Project Layout

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Non-Leased Land
- Existing 345 kV Transmission Line

Temporary Impacts

- Proposed Buried Collection Line
- Proposed Temporary Crane Path
- 1 Proposed Permanent Met Tower
- E6 Turbine Laydown
- Proposed Temporary Structure

Permanent Impacts

- Proposed Access Road
- 1 Proposed Permanent Met Tower
- E6 Turbine Area
- Proposed Permanent Structure

Source: Layout v4.2

N

0 0.25 0.5 Miles

KANSAS
Project Location

TETRA TECH EC INC.

H Rd
I Rd
J Rd
K Rd
L Rd
18 Rd
19 Rd
20 Rd
21 Rd
22 Rd
23 Rd
24 Rd
100 Rd
Chestnut Rd
Denim Rd
Eagle Rd
Foothill Rd
23

Batch Plant
Laydown
Substation
O&M Building

D23A D24 1 D25A D26 D27 D28 D29 D30 D31 D32 D33 D34 D35 D36 D37A D38 D39A

C23A C24 C25B C26A C27 C28 C29A C30 C31 C32 C33 C34A C35 C36 C37A C38 C39 C40 C41 C42A C43B C44B

B5 B6 B7B B8C B9 B10 B11 B12A B13A B14A B15 B16 B17A B18 B19A B20 B21 B22 B23 B24

A1R 2 A2R A15BR A16R A17R A18RA A3RB 3 A4R A5 A7A A8A A9 A10A

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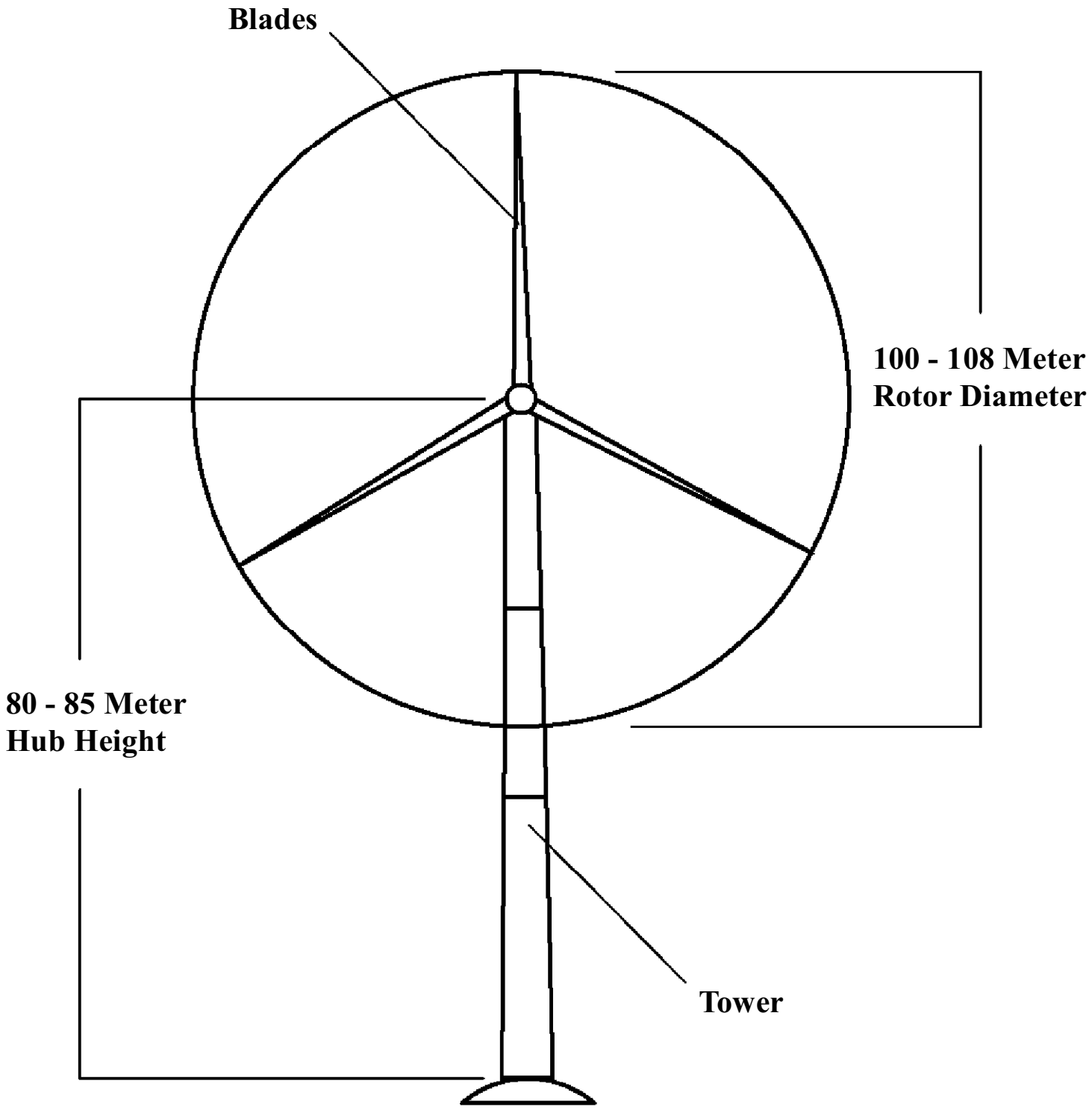

Figure 2-2
Preferred Wind Turbine Generator Models

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

TETRA TECH EC, INC.

Z:\Gdrive\Projects_2008\CPV_Cimarron\Maps\EA\Phase_1\Figure2-2_Turbine_Design.mxd

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 RSA 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, 66 units would be constructed at the Project within the same rows and locations described for the SWT 2.3-101 or SWT 2.3-108. The only difference between the layouts for the GE 2.5xl and the SWT 2.3-101 or SWT 2.3-108 is that six 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 three turbine models varies slightly based on the environmental resource in consideration. Use of either the SWT 2.3-101 and SWT 2.3-108 would require the greater number of total turbines (72) and therefore represents the most comprehensive study area (i.e., greatest physical ground disturbance). Alternatively, should the Project use GE 2.5xl turbines, only 66 of the 72 turbine locations would be required, resulting in less total ground disturbance; however, because the GE 2.5xl turbines are the larger of the three preferred models (assuming the 103-m rotor diameter option, the total tip height is 136.5 m), they may have slightly greater effects on certain environmental conditions (e.g., visual resources) than the SWT 2.3-101 (tip height 130.5 m) or the SWT 2.3-108 (tip height of 134 m). 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.

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.

Table 2-1. Estimated Project Footprint

Project Component	Temporary Disturbance Only (Acres)	Permanent Disturbance Only (Acres)	Total Impact (Acres)
Turbines	122	13	135
Access Roads	45	36	81
Miscellaneous Permanent Components (substation, O&M building, permanent met towers, met tower spur roads)	11	7	18
Miscellaneous Temporary Components (crane path, laydown area, batch plant, buried collection lines, road turnings)	71	0	71
Total*	**249**	**56**	**305**

*Overlap Removed from Total Impact. Total footprint calculations use the 72-turbine Project layout. In comparison, the 66-turbine Project layout would have a smaller temporary and permanent disturbance resulting in a smaller total impact.

2.1.4.4. Electrical System

The Project would interconnect to the on-site Sunflower Holcumb to Spearville 345-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, adjacent to the transmission line. 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 345-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 (often referred to as “homerun” collection lines) 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 345-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 SPP and Sunflower generator interconnection requirements. The Developer tendered a Large Generator Interconnection Agreement (LGIA) with SPP and Sunflower in July of 2011, execution of the LGIA is anticipated in August 2011. The Project would be interconnected per the requirements of the LGIA as part of the overall Sunflower transmission system network upgrades via a short overhead electrical connection line from the substation. However, the system build-out and upgrades represent a separate, independent activity.

Figure 2-3
Setbacks and Siting Considerations

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Non-Leased Area
- Project Layout
- Microwave Beam Path (WCFZ)
- Occupied Structure

Turbine Setbacks

- 1,000 ft from Occupied Structures on Leased Land
- 2,000 ft from Occupied Structures on Non-Leased Land
- 1,000 ft. Leased Parcel Setback

Aviation Systems Sectors

- Sector A - 2790' AMSL
- Sector B - 2790' - 3040' AMSL
- Sector C - 3102' AMSL
- Sector D - 3100' - 3280' AMSL
- Sector F - 3200' AMSL
- Sector G - 3280' AMSL

Grassland Cover Types

- Grassland
- Grassland used as Hayfield
- Invaded Grassland
- Grassland dominated by mostly native species
- Grassland that has been planted
- Grassland that may have been planted
- Grassed Waterway

Source: Layout v4.2, ComSearch 2010, Aviation Systems, Inc. 2011, Tetra Tech 2010a

N

0 0.25 0.5 Miles

KANSAS
Project Location

TETRA TECH EC, INC.

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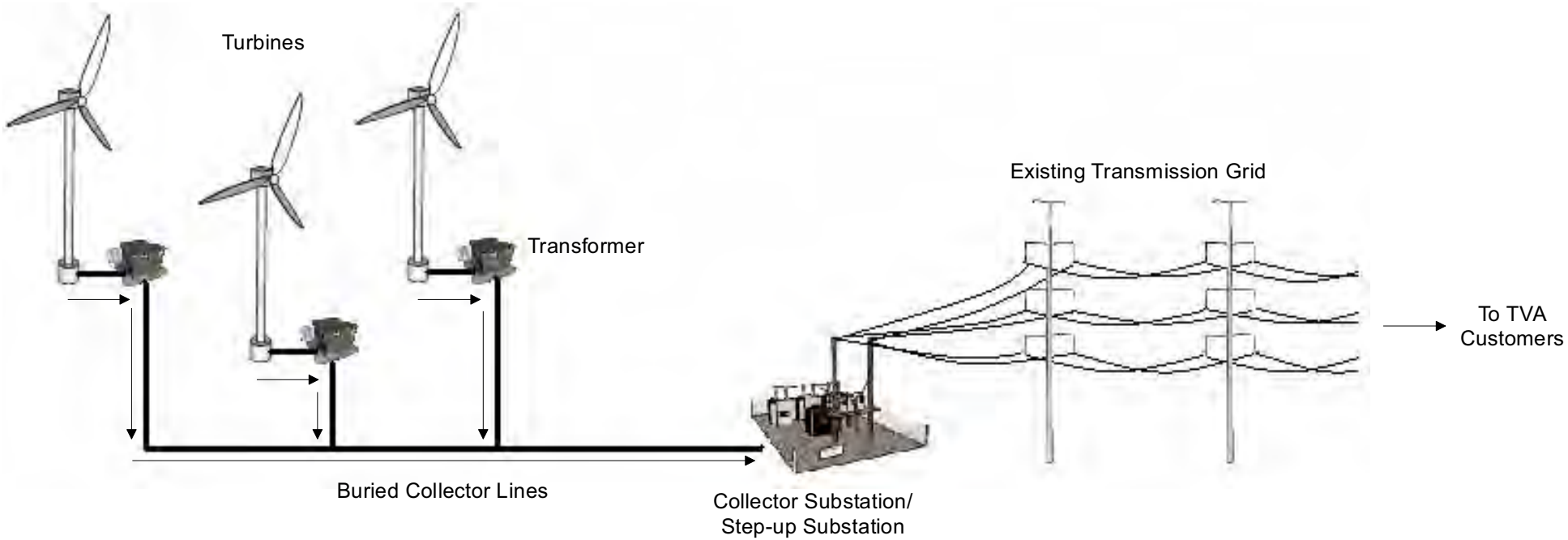

Figure 2-4
Path of Energy Diagram

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

TETRA TECH EC, INC.

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Though the Project would bear some cost for a portion of SPP's transmission system upgrades as part of the SPP'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 SPP system. They have separate and independent utility, and will occur with or without this Project.

2.1.4.5. 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.

2.1.4.6. 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 was completed in October 2011;
- Procurement of Project facility components commenced in October 2011;
- Construction of access roads to be used for construction and maintenance expected to commence as early as December 2011;
- Design and construction of the Project substation expected to commence as early as April 2012;
- Installation of tower foundations expected to commence as early as December 2011;
- Installation of underground cables and collection lines expected to commence as early as May 2012;
- Tower assembly and wind turbine setting expected to occur as early as June 2012;
- System testing of facility expected to occur as early as September 2012; and
- Commencement of commercial production expected to occur during December 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 December 2012. Final Project design will commence November 2011. Project construction could begin as early as December 2011 and end as late as December 2012. Site preparation would begin in December 2011.

2.1.4.7. Construction Management

The Developer has hired 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.

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.

2.1.4.8. 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.

2.1.4.9. 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 20 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.

2.1.4.10. 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 customers 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.

2.3. The Preferred Alternative

TVA's preferred alternative for fulfilling the stated purpose and need is Alternative B, the Proposed Action. This secures for TVA and its customers approximately 165 MW of renewable energy, helps meet TVA's renewable energy goals, and helps TVA meet the future demand for energy on the TVA system.

Table 2-2. Comparison of Alternatives

Resource	Proposed Action	No Action
Geology, Topography, and Soils	• Minimal impacts to geology and topography • 56 acres permanent soil disturbance, including 44 acres of prime farmland and 0.1 acre of soils 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 • Water use for construction and operation would be limited; no new groundwater well would be drilled and the appropriate water appropriation permits would be obtained	• Water resources would persist in current state
Biological Resources	• 249 acres (including 23 acres of native grassland) of vegetation affected during construction • 56 acres (including 5 acres of native grassland) 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	• One architectural property recommended as eligible for National Register of Historic Places (NRHP) • No archaeological sites recommended as eligible for the NRHP	• Cultural resources would remain 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 within or adjacent to the Project Area used for hunting and nature observation • Negligible impacts on existing recreational opportunities near the Project Area such as increased traffic are anticipated	• Recreational resources would continue in current state
Visual Resources	• Project Area would retain overall rural and agricultural visual characteristics	• Visual resources would continue in current state

Resource	Proposed Action	No Action
Noise	• The Project is expected to be consistent with sound generated by comparable wind energy facilities sited with similar setbacks from receptors. • Noise would be temporarily generated during Project construction, but no single receptor would be exposed to significant noise levels for an extended period of time. • At the setback distance proposed by CPV, operation of the Project may result in periodically audible sound at receptors under certain operational and meteorological conditions when background sound levels are low and wind speeds are high enough for the wind turbines to operate.	• 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
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	• Approximately 18 linear mi of new gravel access roads • Minimal impacts to local traffic anticipated during construction • FAA issued Determination of No Hazards for all proposed turbine locations on August 4, 2011	• 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

CHAPTER 3

3.0 AFFECTED ENVIRONMENT

3.1. Geology, Topography, and Soils

3.1.1. Geology and Topography

Southwest Kansas lies within the Great Plains physiographic province, and is comprised of the High Plains and Arkansas River Lowlands sections. Gray County is located entirely within the High Plains section and is bisected by the Arkansas River Lowlands section running approximately east-west (KGS 1997). The Project Area is located entirely in the Upland plains division of the High Plains section, which is characterized by nearly flat to gently rolling upland plains, which slope towards the east at an average gradient of less than 10 ft to the mi. A common feature of these plains is the many shallow undrained depressions which range in diameter from a few tens of feet to more than 1 mi (Latta 1944).

The primary process responsible for shaping the physiography of the Project Area is fluviatile and eolian deposits associated with continental glaciation to the northeast. Representative deposits of each Pleistocene Stage can be found in northeast Kansas (Frye and Byron 1952).

The surficial geology of the Project Area was developed by water-laid sediments of clay, silt, sand, and gravel deposited during the Pleistocene. These deposits filled the lowland area south of the Arkansas River and spread out over the entire surface of adjoining areas. These fluviatile deposits were eroded as the Arkansas River reached its final position, followed by the deposition of wind-blown sand. At approximately the same time, a thin mantle of eolian loess was deposited over the entire area. The loess consists of mostly silt and clay, was followed by recent sedimentation in the valleys where alluvial silt, sand, and gravel have been deposited in the channels and on the flood plains of streams (Frye and Byron 1952).

The surficial sediments of the Project Area are underlain by Upper Cretaceous Era formations deposited while all of Finney and Gray Counties were covered by shallow to moderately deep seas. This environment resulted in the deposition of formations which are comprised of the Greenhorn limestone, Carlisle shale, and several hundred feet of calcareous sediments known as the Niobrara formation. Thin beds of bentonite can be found within these formations, indicating volcanic ash was blown into this marine environment while these sediments were deposited. The deposition of these sediments was followed by tilting of these strata in the late Cretaceous or early Tertiary period that results in the gentle dip of these formations to the northeast. These formations were gently folded during this same period, resulted in the synclinal trough that now trends north-south from the Arkansas Valley northward into, what is now, Scott County. This trough and the erosional surface of the Cretaceous sediments were followed by the deposition of clay, silt, sand and gravel during the Tertiary period. These uncemented stream deposits comprise what is now known as the Ogallala formation, which now underlies the entire Project Area. The shallow depressions that are present throughout Gray County and the Project Area are thought to be a result of solutioning and mechanical settling of the underlying Cretaceous beds (Latta 1944). Most scientists now agree that these features are a result of a variety of geomorphic processes (KGS 2010).

According to the Kansas Geological Survey (KGS), Kansas is located in an area of low earthquake probability (KGS 2000). This information is supported by the 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).

No active oil and gas production wells were identified as located in the Project Area (KGS 2011a).

3.1.2. Soils

Soils underlying the Project Area consist of silt and clay loams developed over the underlying Ogalalla formation. Of these soils, the Spearville silty clay loam and the Harney silt loam dominate and make up almost 75 percent of soils in the Project Area (Table 3-1; Figure 3-1). The Harney silt loam is dark grayish brown and has a surface layer 12 inches deep, underlain by a 23 inch sublayer. This soil occurs in moderately sloping, well-drained areas. The Harney silt loam is the Kansas state soil and is widely regarded as one of the most fertile soils in the world (NRCS 2008). The distribution of other soils in the Project Area follows the topography and erosional surfaces throughout the Project Area.

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

Map Unit Name	Area (acres)	Percentage of Project Area (13,883 acres)
Bridgeport silt loam, channeled	319.09	2.30
Harney silt loam, 0 to 1 percent slopes	3421.46	24.64
Ness clay	312.61	2.25
Penden clay loam, 7 to 15 percent slopes	67.87	0.49
Richfield silt loam, 0 to 1 percent slopes	319.56	2.30
Richfield silt loam, 1 to 3 percent slopes	901.07	6.49
Spearville complex, 1 to 3 percent slopes, eroded	434.41	3.13
Spearville silty clay loam, 0 to 1 percent slopes	6711.60	48.34
Uly-Coly silt loams, 3 to 6 percent slopes, eroded	58.94	0.42
Uly silt loam, 1 to 3 percent slopes	607.12	4.37
Ulysses silt loam, 3 to 6 percent slopes	729.59	5.26

SSURGO = Soil Survey Geographic Database

Source: USDA 2008

Figure 3-1
Soils

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Project Layout

Soils

- Bridgeport silt loam, channeled
- Harney silt loam, 0-1% slopes
- Ness clay
- Penden clay loam, 7-15% slopes
- Richfield silt loam, 0-1% slopes
- Richfield silt loam, 1-3% slopes
- Spearville complex, 1-3% slopes, eroded
- Spearville silty clay loam, 0-1% slopes
- Uly silt loam, 1-3% slopes
- Uly-Coly silt loams, 3-6% slopes, eroded
- Ulysses silt loam, 3-6% slopes

Source: Layout v4.2, USDA SSURGO database for Gray County, KS. 2008

N

0 0.25 0.5 Miles

KANSAS

Project Location

TETRA TECH EC, INC.

Z:\Gdrive\Projects_2008\CPV_Cimarron\Maps\EA\Phase_1\Figure3-1_Soils.mxd

3.2. Water Resources

3.2.1. Surface Waters and Floodplains

The Project Area lies within the Buckner Creek Watershed (Hydrologic Unit Code 11030006), which occurs in the Arkansas River drainage basin. The regional topography is very flat with many shallow and often dry stream drainages (Figure 3-2). The South Fork of Buckner Creek drains to the northeast across the Project Area, and the Arkansas River is located approximately 3.25 mi south of the Project Area. Streams with perennial flow are absent from the Project Area. According to the National Land Cover Dataset (NLCD), open water accounts for 34 acres, or 0.2 percent of the entire Project Area.

Section 303(d) of the CWA requires states to identify all water bodies where state water quality standard are not being met. While only seven impaired lakes are listed in the 2010 303(d) Impaired or Potentially Impaired Waters list, none occur in Gray County (KDHE 2010).

Freshwater use in Gray County is largely derived from groundwater sources; surface water is used in livestock production. Public supply and domestic use of freshwater accounts for 1.33 million gallons per day (MGD) in freshwater use (USGS 2009). Additional information on freshwater use is found in Chapter 3.2.3 of this EA.

Gray County does not participate in the Federal Emergency Management Act (FEMA) National Flood Insurance Program and no Federal Insurance Rate Mapping (FIRM) is available for the Project Area. During a pre-construction meeting on July 6, 2009, the KDA confirmed that a Floodplain Fill Permit would not be necessary to construct the Project.

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.

The Cowardin classification system categorizes wetlands by vegetative community and hydrologic regime (Cowardin et al. 1979). The Cowardin classification of the wetlands within the Project Area are predominantly palustrine (i.e., freshwater) emergent (non-woody plants rooted in soils that are saturated at least part of the time) wetlands. These palustrine emergent (PEM) wetlands are located mostly within or adjacent to playa lake features throughout the Project Area (Figure 3-2). According to the USFWS National Wetlands Inventory (NWI) dataset, 242 acres or 1.7 percent of the Project Area is classified as wetlands.

Compliance with Executive Order 11990

In compliance with EO 11990 and to support TVA’s role as lead federal agency, wetlands were delineated in the field to determine the types and extent of wetlands present. This section presents functions and values associated with the Project Area in support of TVA’s EO 11990 compliance.

Figure 3-2
Wetlands and Surface Waters

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Project Layout
- NHD Flowline
- NHD Waterbody
- Playa Lakes
- NWI Wetlands
- Field Delineated Wetlands

Source: Layout v4.2, NWI, NHD, Kansas GIS.

N

0 0.25 0.5 Miles

KANSAS

Project Location

TETRA TECH EC, INC.

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The Project is located in the Playa Lakes wetlands region of the United States. Playas are unique wetlands features, providing ephemeral reservoirs of water in parts of the southern Great Plains that are primarily active cropland and that can receive less than 20 inches of rain a year (USEPA 2009b). Playa wetlands have many unique functions and values, including:

- Wildlife and Vegetation Values – Playa lake wetlands provide essential floral and faunal habitat. Two million waterfowl commonly winter in the Playa Lakes region, along with a variety of small mammals, amphibians, and macroinvertebrates. A significant rainfall event in a playa lake attracts not only wildlife, but new vegetative growth, such as aquatic plants, that can be seen for weeks afterwards. Playa lakes are very important to maintaining biodiversity in the region, as without the wetlands areas, only a few species adapted to living in the agricultural environment would likely thrive in the region (USEPA 2009b).

- Recreational Values – The high biodiversity in playa lakes makes them "hot spots" for waterfowl hunting and wildlife viewing (NRCS 2008). In Kansas, the type and quality of available habitat greatly influence migration timing, species composition, and abundance of ducks. Conservation efforts to preserve habitats, such as playa lakes, are important for maintaining duck hunting opportunities in Kansas (KDWP 2011).

- Groundwater Recharge Values – The playa lakes recharge aquifers, especially the Ogallala Aquifer basin. The Ogallala Aquifer provides water for a variety of purposes to the region, including municipal drinking water, industrial uses, and irrigation. The Ogallala Aquifer is primarily recharged by playa lakes in the region, where moisture retained by the clay soils underlaying the playa lakes slowly percolates down to the water table (KAWS 2011).

- Flood Mitigation – Playa lake wetlands help to retain water during and after storm events and during spring runoff. This retention of water mitigates the flooding impacts to surrounding uplands (e.g., soil erosion).

- Sediment and Chemical Filtration – Playa lakes slow down water flow over the land and allow excess sediment and chemicals such as agricultural byproducts (e.g., fertilizers and pesticides) to filter down through the wetland subsoils. Chemical and sediment concentrations are thereby reduced when they reach the receiving watershed (TPWD 2007).

During field surveys of the Project Area, many species of wildlife were observed using playas or are generally known to benefit by this wetland habitat. Several bird species observed during 2010 avian surveys for the Project are known to use playa lake wetlands, including red-winged blackbird (*Agelaius phoeniceus*), western meadowlark (*Sturnella neglecta*), sandhill crane (*Grus canadensis*), and Canada goose (*Branta canadensis*), and raptors such as Swainson's hawk (*Buteo swainsoni*) and Northern harrier (*Circus cyaneus*). Finally, two reptile observations were made during a wetland survey (Appendix C), including the prairie rattlesnake (*Crotalus viridus*) and plains garter snake (*Thamnophis radix*). These species observations demonstrate the wildlife functions and recreational values that playa habitats provide.

3.2.3. Groundwater

Nearly all freshwater is obtained from groundwater resources; a USGS study of water use in 2005 reports that of the 179.4 MGD of freshwater consumed, only 0.01 MGD was obtained from surface water sources. Of the freshwater consumed in Gray County, 98 percent is used in

irrigation (USGS 2009). There are no sole-source aquifers in USEPA Region 7, which includes Kansas.

The High Plains aquifer is the most important water source for much of western and central Kansas. It is a large body of sands, gravels, silts and clays, covering approximately 33,500 mi^2 of surface area. In western Kansas it is generally identical with the Ogallala formation, and the aquifer system was originally known as the Ogallala aquifer. This aquifer is over 500 ft deep below land surface in parts of southwestern Kansas. The water source consists of Pliocene to late Holocene age sediments (about 5 million years old), deposited by eastward-flowing streams and by wind as unconsolidated clay, silt, sand, and gravel in amounts that vary across the region (Macfarlane et al. 2000). Natural recharge to the High Plains aquifer from precipitation is low, in part because much of the rain falls during the growing season, when plant roots intercept the soil moisture. In western Kansas, where precipitation is scant and the water table is relatively deep (several hundred feet) in many places, recharge occurs infrequently and the long-term average is less than an inch per year (KGS 2009).

In the valley of Buckner Creek, the water table is fewer than 25 ft below the surface. Wells in this basin obtain water from sand and gravel in the Ogallala formation (Latta 1944). According to the Kansas Geologic Survey Water Wells Completion Database, well yields in the Project Area range from 8 to 100 gallons per minute and are used for domestic or agricultural purposes (KGS 2011b).

3.3. Biological Resources

3.3.1. Vegetation

The Project Area encompasses land that is a mix of cropland (corn, milo, soybean, wheat, hay, and sunflower) native grassland, and pasture. 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, soybeans, sunflower or corn with rotations to hay land crops in cycles. Cropped species are not static and tilled areas would fluctuate with market demands and farm-specific operational requirements. Native grasslands serve 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 grassland's fertile soils and predominantly flat topography, large portions of the native grasslands have been converted to agricultural lands. This widespread loss of native grasslands makes this an ecosystem of conservation concern and among the rarest ecosystems in North America (Samson et al. 1998).

Native grasslands also serves as vital 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 game birds and are often managed locally by state fish and game agencies for hunting purposes.

CPV has conducted a native grasslands survey for the Project (see Appendix E). Prior to field surveys, Geographic Information System (GIS) specialists performed a desktop analysis of grassland and crop land cover of the Project Area using Kansas GAP Analysis Program (GAP)

data from the Kansas Applied Remote Sensing Program (KARS 2001). A grassland biologist conducted field surveys in June 2009 to determine the accuracy of the land cover data bases. Identification of native grasslands was based on several visual cues: 1) the presence of native grassland grass species, including big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), and sideoats gramma (*Bouteloua curtipendula*); 2) the presence of non-native species in core areas away from fence lines, including cheatgrass (*Bromus tectorum*), field bindweed (*Convolvulus arvensis*), and Johnsongrass (*Sorghum halapense*); 3) rolling topography that renders land less feasible for tilling; 4) the presence of rock piles which indicate clearing of rock from an area in preparation for cultivation; and 5) crop vegetation growing in obvious rows.

At the time of the survey, 1,403 acres (11% of the area surveyed[1]) were classified as containing native grassland plant species (Figure 3-3; Table 3-2; Tetra Tech 2010a). An additional 89 percent were either developed (residences, farm buildings, roads), active crops (corn, alfalfa, soybeans) or grazing pastures for cattle. As such, all grasslands depicted in Figure 3-3 may have potential value in a management or conservation context. However, terrain classified in two categories ("Grassland" and "Grassland dominated by mostly native species") represent the best native grassland habitat observed within the study area and, therefore, is the most worthy of additional attention during Project development.

None of the plant species identified are listed as federally protected as endangered, threatened or species of concern. The State of Kansas does not provide rare plant species with additional legal state protection other than the already federally listed species.

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

Vegetative Land Cover	Acreage	Percent of Vegetative Land Cover
Grasslands dominated by mostly native vegetation	415	3.24
Grasslands that has been planted	328	2.56
Grasslands that may have been planted	274	2.14
Grasslands	181	1.42
Invaded grasslands	148	1.16
Grasslands used as hayfields	29	0.22
Grassed waterway	28	0.22
Total Grasslands	**1,403**	**10.96**
Cultivated and developed lands	**11,338**	**89.04**
Total*	**12,786**	**100**

Source: Tetra Tech 2010a
* Total acreage assessed during vegetation field survey is less than total Project Area (13,883 acres) as some parcels (1,093 acres) in the current Project Area were not under Easement Agreement at the time of the Native Grassland Survey.

[1] Total acreage assessed during vegetation field survey in 2009 is less than total Project Area (13,883 acres) as some parcels in the current Project Area (1,093 acres) were not under lease at the time of the Native Grassland Survey.

Figure 3-3
Vegetative Cover

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Project Layout

Grassland Cover Types

- Grassland
- Grassland used as Hayfield
- Invaded Grassland
- Grassland dominated by mostly native species
- Grassland that has been planted
- Grassland that may have been planted
- Grassed Waterway
- Area not Covered During Grassland Survey

Source: Layout v4.2, Tetra Tech 2010a.

N

0 0.25 0.5 Miles

KANSAS

Project Location

TETRA TECH EC, INC.

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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 KDWPT, Kansas Natural Heritage Inventory (KNHI), Kansas Ornithological Society (KOS), Mammals of Kansas (http://www.ksr.ku.edu/libres/Mammals_of_Kansas/), Ranchland Trust of Kansas, USDA, and USFWS.

Wildlife within the Project Area consists of birds, mammals, reptiles, and amphibians both resident and migratory, which utilize the habitat for foraging, migratory stopover, breeding and/or shelter. Species present in the Project Area are associated with agricultural fields, pasture and grasslands, and wetland areas. Common mammals in the Project Area include raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and eastern cottontail (*Sylvigagus floridanus*).

3.3.2.1. Avian Species

Kansas has 469 documented bird species (KOS 2010a) that are known to occur in the state and is situated within the Central Flyway, one of the main bird migratory routes (USFWS 2011a). The Central Flyway runs through the central portion of the United States and, as a consequence, the Project Area. A spring avian survey was conducted in 2010 by a trained and qualified ornithologist for the Project Area in order to quantify local avian use during the spring migratory period within the area and to identify potential avian impacts associated with building and/or operating the proposed Project (Tetra Tech 2010b; Appendix F). Weekly surveys were performed in the Project Area between March 23 and June 21, 2010. Fixed point count surveys (800-m radius) were conducted at six points distributed throughout the Project Area. CPV also completed a fall 2010 avian point count survey (Tetra Tech 2010c, Appendix G). The survey was conducted from August 20 to November 19, 2010, encompassing the fall migration and early winter seasons. The same six point count locations and methodology were used during spring and fall surveys. In addition to the spring point count surveys, raptor nest and prairie grouse lek surveys were conducted to estimate the number of active and inactive raptor nests and locate any prairie grouse leks within the Project Area. Raptor nest surveys did not include nest searches for ground-nesting raptor species. Lek surveys were conducted between March 20 and April 20, 2010 using protocols recommended by the KDWPT and incorporating recommendations from the Lesser Prairie-Chicken Conservation Initiative (Davis et al. 2008). Results of the lek surveys are discussed under the lesser prairie-chicken section in Chapter 3.3.3.

Waterfowl, Waterbirds, and Cranes

Certain species of waterfowl (ducks and geese), waterbirds (killdeer and herons), and cranes are known to migrate in large numbers through the Central Flyway and the Project Area (USFWS 2011a). During the spring survey, cranes/rails had the second highest mean use among species groups, a value largely driven by large flocks of migratory sandhill cranes totaling 2,105 individuals. During the fall survey, Canada goose had the highest mean use for waterfowl and was the fourth most common bird species observed within the Project Area (209 individuals).

Raptors

Most raptor species observed were seen infrequently in the Project Area. Northern harriers and Swainson's hawks were the most commonly observed raptor species during the spring and fall 2010 surveys. During fall 2010 avian survey, one golden eagle (*Aquila chrysaetos)* was

observed in the Project Area at point count location 6. No golden eagles were seen during the spring 2010 surveys. A list of other raptor species observed can be found in the spring 2010 Avian Survey and the fall 2010 Avian Survey in Appendices F and G.

A total of five red-tailed hawk (*Buteo jamaicensis*), three great-horned owl (*Bubo virginianus*), and one Swainson's hawk nests were identified during spring raptor nest surveys. Nests were located along windbreaks or around riparian corridors. Nest heights ranged from 5 m to 12 m.

3.3.2.2. Bats

Tetra Tech EC, Inc. (Tetra Tech) performed a bat likelihood of occurrence assessment for the Project (Appendix H), which 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, 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, 18 occur in Kansas. Of these 18 species, 11 potentially occur within the proposed Project Area based on known distribution ranges. A list of these species can be found in the Bat Likelihood of Occurrence Report (Appendix H). None of these 11 species are federally listed as threatened or endangered. Two of the 11 species that could potentially occur within the Project Area − pallid bat (*Antrozous pallidus*) and Townsend's big-eared bat (*Corynorhinus townsendii*) − are listed as Species in Need of Conservation in Kansas. Although the Project Area contains a low absolute amount of potentially suitable bat habitat, when viewed on a regional scale the Project Area contains almost three times as much habitat as the surrounding buffer, indicating a relative attractiveness of the habitat within Project Area to the 11 bat species that could potentially be found using or traveling through the Project Area. Most of this potentially attractive habitat is found in the northeast corner of the Project Area.

3.3.3. Rare, Threatened and Endangered Species

No federally threatened or endangered species have been found within the Project Area according to the USFWS (2011b). Of the federally listed species known to occur within Kansas, only the whooping crane (*Grus Americana* – endangered), least tern (*Sterna antillarum* – endangered); and piping plover (*Charadrius melodus* – threatened) may occur in the Project Area and are therefore are the subject of Section 7 consultation under the ESA between TVA and USFWS. Additionally, an assessment of two other species, lesser prairie-chicken (*Tympanuchus pallidicinctus* – candidate) and golden eagle (protected by BGEPA), have been included.

3.3.3.1. Whooping Crane

There are several factors which may threaten the whooping cranes. 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 turbines, power lines, fences, and other structures, loss and degradation of stopover and wintering habitat (CWS and USFWS 2007; USFWS 2009).

Whooping cranes are a regular spring and fall migrant in Kansas. The whooping crane was considered endangered in the United States in 1970 and was 'grandfathered' into the ESA (CWS and USFWS 2007). Due to intensive management, the wild migratory population (referred to as the Aransas-Wood Buffalo population) has increased from 15 birds in 1941 to 279 as May of 2011 (WCCA 2011). In Kansas, 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 wide migratory corridor (Austin and Richert 2001). The Project is located in the western edge of the whooping crane migration corridor. Whooping cranes have been observed in Gray County but there are no records of a siting within the Project Area. However, the area has not been historically systematically surveyed; thus the absence of observations does not mean that whooping cranes have not previously occurred in the Project Area. Tetra Tech conducted a whooping crane likelihood of occurrence assessment for the Project Area that concluded a low likelihood of whooping cranes using the Project Area (Tetra Tech 2010d). The Project Area is located on the western edge of the whooping crane migration corridor and is on 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. The Whooping Crane Likelihood of Occurrence Report is included in Appendix I.

3.3.3.2. Least Tern

Least terns nest on sparsely vegetated sand and gravel bars along wide, unobstructed river channels or salt flats adjacent to lakes. Nest sites are usually elevated above the water level and are no more than several hundred meters away from the shore (USFWS 1990). In Kansas, least terns breed in the Quivira National Wildlife Refuge (NWR) and along the Cimarron River in Meade County (USFWS 1990, Thomson et. al 1997). Least terns migrate to wintering grounds in Central and South America (Thomson et al. 1997).

The interior population of the least tern was listed as federally endangered in 1985. KDWPT also lists the least terns in Kansas as endangered (KDWP 2010). This species historically bred along the Mississippi, Red, and Rio Grande Rivers. Today it can be found along these same rivers, but only in isolated segments that have been minimally altered by humans. Recent declines in the interior populations of least terns have been linked to decreases in nesting habitat by flooding behind dams, channelization, and untimely release of water from dams (USFWS 1990, Thomson et al. 1997).

The Project Area is 60 mi northwest of the closest breeding grounds on the Cimarron River, and these terns' home ranges are no larger than 4 mi^2 around the nest site (USFWS 1990). Migrating least terns could pass over the Project Area but, due to lack of suitable habitat, the likelihood of them stopping over or otherwise occurring in the Project Area is low. No least terns were observed within the Project Area during Spring 2010 or Fall 2010 avian point count surveys.

3.3.3.3. Piping Plover

This shorebird winters along the Gulf and south Atlantic coasts and breeds in south-central Canada, the Dakotas, Nebraska, and northern Kansas (Elliott-Smith and Haig 2004). They are not known to breed in Gray County. Although knowledge of specific migratory routes is incomplete, some individuals stop over at Cheyenne Bottoms NWR, though most birds are thought to make the migratory trip nonstop (Elliott-Smith and Haig 2004). The habitat types used most often during migration are beaches and alkali flats, with predominantly muddy substrates (Elliott-Smith and Haig 2004). Some populations of piping plovers likely migrate over the Project

Area; however, due to lack of suitable habitat in the Project Area, the probability of this species occurring there is low.

The Great Plains population of the piping plover was listed as a threatened species in 1985 (USFWS 1988). KDWPT also list the piping plovers in Kansas as threatened (KDWP 2010). 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. The piping plover has been documented in five counties in Kansas, primarily in wetlands in the area of Cheyenne Bottoms NWR (KDWP 2010, USFWS 1988). As with most migratory birds, piping plovers could collide with power lines and other structures during migration (USFWS 1988), but no wind generation-related fatalities have been reported.

The USFWS and KDWPT list the piping plover as not occurring within Gray County. No suitable breeding habitat (i.e., alkali lakes) is located within the County or the Project Area. No piping plovers were observed within the Project Area during Spring 2010 or Fall 2010 point count surveys. However, piping plovers could occur as a migrant moving through the Project Area.

3.3.3.4. Lesser Prairie-Chicken

The lesser prairie-chicken range is restricted to extreme southeast Colorado to southwest Kansas counties bordering along Colorado and Oklahoma, all the panhandle and northwest counties of Oklahoma to southeast New Mexico and much of central Texas and the Texas panhandle (Hagen and Giesen 2005). The areas where leks (groups of males that display to attract females) are located are characterized by sparse vegetation and are typically located on knolls or ridges. Habitats used for nesting and brood-rearing are usually within 3 kilometer (km) of leks (Hagen and Giesen 2005). However, distribution and population size have been reduced by the activities of humans, even though it occurs in areas with low human population densities. Recurrent droughts, combined with excessive grazing of rangelands by livestock and conversion of native rangelands to cropland, have significantly reduced populations and the distribution of the lesser prairie-chicken since the early 1900s (Hagen and Giesen 2005).

Four active lesser prairie-chicken leks were found outside of the Project Area during the grouse lek surveys (Appendix F). The lek sizes ranged from high counts of 11 to 30 birds and are located 2.5 to 5 mi from the nearest proposed turbine to the northeast of the Project Area (Tetra Tech 2010b). All four leks remained active throughout the survey period. No lesser prairie-chickens were observed within the Project Area. Currently, lesser prairie-chicken is still considered a game species by KDWPT and is not protected by the MBTA. In July of 2009, the KOS along with six chapters of the National Audubon Society in Kansas petitioned KDWPT requesting the department to consider an emergency listing of the lesser prairie-chicken as a state threatened species (KOS 2010b); the petition was declined in 2010. Currently the USFWS has designated the lesser prairie-chicken as a candidate species to be listed as threatened.

3.3.3.5. State Listed and Other Sensitive Avian Species

No federally threatened or endangered species have been observed in the Project Area. During the fall 2010 avian survey, one golden eagle was observed in the Project at point count location 6. The golden eagle is a slow-reproducing, long-lived species and, as a result, local populations may be sensitive to small changes in adult survival; hence, even a few fatalities could have local population implications (Kochert et al. 2002). In the western United States, the golden eagle breeds and forages in open and semi-open habitats such as mountainous canyons, riparian corridors, open deserts and grasslands (Kochert et al. 2002). Hunting is often accomplished by

low flying “contour hunting” by using ridgelines to quickly surprise prey such as prairie dogs, ground squirrels, and rabbits (Kochert et al. 2002). The golden eagle and bald eagle (*Haliaeetus leucocephalus*) are protected by the BGEPA. The BGEPA prohibits the take of any bald or golden eagle, alive or dead, including any part, nest, or egg. “Take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb” a bald or golden eagle. “Disturb” means to agitate or bother an eagle to a degree that causes, or is likely to cause, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. Currently, the final rule allowing for take permits is in effect; however, permits for take under this rule have not been authorized due to the lack of implementing guidelines. In the absence of permits, the USFWS is recommending that project proponents consult with them to discuss if an Avian Protection Plan would mitigate the risk to the eagles.

State-listed species observed during Spring 2010 avian surveys or as incidental observations included four short-eared owls (*Asio flammeus*; Appendix F). Short-eared owls are considered a species in need of conservation in Kansas. State-listed species observed during Fall 2010 avian surveys or as incidental observations included two ferruginous hawks and are also classified by the State as a species in need of conservation (Tetra Tech 2010c; Appendix G).The short-eared owl and ferruginous hawk 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 EO 13186 regarding migratory birds.

3.4. Cultural Resources

Cultural resources include archaeological sites, standing structures, objects, districts, traditional tribal properties, and other properties that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities or social groups. The Developer conducted cultural resources investigations to identify possible Project effects on archaeological sites and historic architectural resources that are potentially eligible for listing in the NRHP and/or the Register of Historic Kansas Places (Tetra Tech 2011a, 2011b, 2011c, 2011d, and 2011e). The following cultural resource investigations were conducted:

- Phase I archaeological reconnaissance survey to identify previously recorded cultural resources within the Project Area and environmental and cultural contexts for identifying archaeological sensitivity for unrecorded archaeological sites (Tetra Tech 2011a; Appendix J);

- Phase II intensive archaeological survey to investigate if unrecorded archaeological sites are present within the area of potential effect (APE) for archaeology. The APE for archaeology includes all areas of proposed ground disturbance from Project construction, operation and decommissioning (Tetra Tech 2011b; Appendix K);

- Supplemental Phase II intensive archaeological survey to investigate if unrecorded archaeological sites are present within a supplemental APE (Tetra Tech 2011e, Appendix L);

- Historic architecture reconnaissance survey inventoried buildings 50 years old, or older, within an APE for architecture within 0.5 mi of turbines and other above ground Project structures (Tetra Tech 2011c; Appendix M); and

- Supplemental historic architecture reconnaissance survey investigated two properties identified by SHPO as potentially NRHP-eligible (Tetra Tech 2011d; Appendix N).

These studies were conducted in anticipation of TVA's continuing consultation with the Kansas State Historical Society, which serves as the SHPO, and interested federally recognized Native American Tribes. Figure 3-4 depicts the Project APEs described above.

During the last 12,000 years, the Project Area has maintained grasslands associated with the High Plains and was possibly occupied by human groups. The Arkansas River, approximately 3 mi south of the Project Area, and its tributaries provided a natural thoroughfare for movements of animals and people. Water was a critical resource on the arid Plains and was most predicable along the Arkansas River or at springs along creeks.

Archaeological sites have been rarely reported in Gray County. Archaeological sites from the Middle and Late Ceramic Periods (A.D. 1 to 1500) have been reported along streams south of the Project Area in southern Gray County (KSHS 2010a). Increasing bison herds, trade with Europeans and the diffusion of horses during the A.D. 1600s and 1700s brought successive waves of Native American Tribes, including Apache, Kiowa, Comanche, Cheyenne and Arapaho from the Northern and Central Plains into western Kansas. The Medicine Lodge Creek Treaty of 1867 assigned a reservation to these groups south of the Arkansas River and far to the east of the Project Area (Fowler 2001).

European explorers and traders rarely visited western Kansas from the A.D. 1500s through the 1700s (Thomas 1928). The Santa Fe Trail was established in 1821, following the Arkansas River bringing immigrants from American settlements along the Missouri River westward to Spanish settlements at Santa Fe and the Rocky Mountains. The Santa Fe Trail was approximately 3 mi south of the Project Area. Uplands around the Santa Fe Trail, including perhaps the Project Area, could have been scouted and hunted regularly by the wagon trains, and by Native Americans who often monitored the emigrants (Barry 1973). Travelers and traders used the Santa Fe Trail through Gray County until the 1870s, when the Atchison, Topeka and Santa Fe Railroad (AT&SFRR) reached western Kansas. Dodge City was founded in 1872 along the AT&SFRR and quickly became the destination for Texas cattle drives up the Great Western Cattle Trail. Buffalo hunters also shipped millions of bison skins, meat, and bones from Dodge City.

Completion of the railroad brought a flood of homesteaders. In 1887, Gray County was established. The northeastern corner of the county was named Foote Township, an area of approximately 120 mi^2 that included most of the Project Area. That year, a county census listed 4,896 people and 912 households (Blackmor 1912 1:782).). Most early homesteads were dugouts or constructed of sod (Luther 1955:2-3). None of these pioneer dwellings have survived to the present. However, archaeological remains might be located in the Project Area. Blizzards, droughts, dust storms, and insect pests drove many early settlers away from Gray County (Luther 1955:2-3; Malin 1946). By 1890, Gray County had declined to 2,415 people and in 1900 to 1,264 people, a loss of more than two-thirds of the population and households since the founding of Gray County 13 years earlier. Only 123 people and 31 farms remained in Foote Township by 1900 (Ancestry.com 2010).

Location 2
Location 1
Location 3
Location 4
Location 5
Location 6
Location 7
F O O T E
F O O T E
Cimarron
ARKANSAS RIVER
ARKANSAS RIVER
C I M A R R O N

Figure 3-4
Cultural Resources

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Project Layout
- Historic Sensitivity - Abandoned Farmsteads
- Area of Potential Effect (APE) for the Class III Archeological Survey (Construction Footprint + Buffer)
- Area of Potential Effect (APE) for the Architectural Survey (≥0.5 mile from all turbines)
- Approximate Location of Santa Fe Trail

Source: Layout v4.2, Tetra Tech 2011a, National Park Service.

N

0 0.25 0.5 Miles

KANSAS
Project Location

TETRA TECH EC, INC.

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From 1900 to 1930, populations increased in Gray County and Foote Township, driven by expanding farms and croplands. The Great Depression of the 1920s and 1930s and droughts of the Dust Bowl were hard times in Gray County (University of Kansas 2009). Landscape changes probably occurred in the Project Area from dust storms, wind erosion, dune deposits, and field reclamation efforts during the 1930s. However, the area of agricultural land increased during the 1940s in Gray County, aided by programs by the United States Department of Agriculture (USDA) Soil Conservation Service. In 2000, there were 126 people and 57 households/farms in Foote Township.

Recent aerial photography analysis of modern land use determined that approximately 88 percent of the Project Area is plowed for crops, including winter wheat and sorghum, while 12 percent of the Project Area is in grassland (Tetra Tech 2010a). Only approximately 3.5 percent of the Project Area is dominated by native grasses, suggesting only limited areas without ground disturbances from historic agricultural practices (Tetra Tech 2010a). Major ground disturbances include draining and grading of playa lakes, field leveling for construction of pivot irrigation systems, and field terracing and berm construction to reduce water runoff and soil erosion.

SHPO's review of the proposed Project maps recommended that most level uplands were rarely occupied by Native Americans. Archaeological sites associated with Native American occupations are most likely along the entrenched valleys of Buckner Creek and on the margins of former playa lakes (Weston 2009).

TVA requested comments on the proposed Project from the following Native American Tribes:

- Apache Tribe of Oklahoma;
- Arapaho Tribe of the Wind River Reservation, Wyoming;
- Cheyenne-Arapaho Tribes of Oklahoma;
- Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana;
- Comanche Nation of Oklahoma;
- Kiowa Indian Tribe of Oklahoma;
- Kaw Nation;
- Osage Nation of Oklahoma; and
- Wichita and Affiliated Tribes.

The Osage Nation of Oklahoma requested that an archaeological survey of the proposed Project be conducted (Munkres 2011); archaeological surveys of the Project were completed and are presented in Appendices K and L.

Phase II intensive archaeological field investigations included pedestrian surveys and shovel testing to identify prehistoric and historic period cultural remains in the APE (Appendix K). The entire APE was inspected during the pedestrian survey. One historic period archaeological site (Site 1 – 14GY100) was identified during the pedestrian survey. Site 1 contained twentieth-century well drilling equipment, metal cans, drums and other items. The site was not recommended as potentially eligible for the NRHP. No isolated historic artifacts and no prehistoric artifacts were observed during the pedestrian survey.

Shovel tests were excavated close to possible water sources (within 100 m wetland buffers) and in areas of poor ground visibility (less than 40%). In total, 514 shovel tests and four radial shovel tests were excavated. Shovel testing encountered only one prehistoric artifact, a small translucent brown chalcedony flake. Four radial shovel tests encountered no additional artifacts. This one flake is classified as an isolated find, rather than an archaeological site. In another shovel test, a modern wire nail was recovered, probably associated with fence construction or repair, and is not considered a potentially significant historic artifact.

Due to minor changes in the Project layout since the Phase II intensive archaeological survey, a supplemental Phase II intensive archaeological investigation was conducted for the previously unsurveyed portions of the new APE (Appendix L) using the same methodology as the original Phase II survey. One historic period archaeological site (Site 2 – 14GY102) was identified during the supplemental survey. Site 2 contained artifacts dating to the early twentieth century. In total, 89 shovel tests were excavated in the APE with an additional 22 shovel tests dug at Site 2 within and around the surface cluster of historic-period artifacts. Domestic, work, and transportation-related artifacts, and lack of architectural artifacts or buried features, suggest Site 2 possibly functioned as a short term camp, rather than a homestead. The artifact cluster at Site 2 is small, and shovel testing provided no evidence for preserved structural or technological features. The site was not recommended as potentially eligible for the NRHP. No isolated historic artifacts and no prehistoric artifacts were observed.

In conclusion, no potentially significant archaeological sites were discovered as a result of the Phase II or supplemental Phase II surveys. Much of the APE has been disturbed by agricultural plowing, irrigation and erosion controls. The APE avoids substantial playas, wetlands and streams, when possible, probably reducing potential impacts on areas sensitive for prehistoric archaeological sites. APE setbacks from roads and existing dwellings also reduce impacts on possible historic-period archaeological sites. No additional archaeological investigations were recommended by TVA to SHPO for this Project (Tetra Tech 2011b and Tetra Tech 2011e). SHPO concurred with the findings of both the Phase II and supplemental Phase II reports in letters dated September 8, 2011 and November 4, 2011 respectively.

Tetra Tech (2011c and 2011d) conducted historic architectural surveys of properties within the architectural APE. In total, 21 properties were recorded that were 50 years old or older (Appendix M). SHPO requested additional information about the NRHP-eligibility of two properties (Zollner 2011). A supplemental evaluation performed for these two properties (Appendix N) specifically focused on a review of the resources in the context of the NRHP Historic Agriculture-Related Resources of Kansas Multiple Property Documentation Form. One farm complex, TTCW8, was recommended as eligible for the NRHP by TVA. A barn, TTCW20, was recommended as not eligible for the NRHP (Tetra Tech 2011d) by TVA. These findings were presented to the SHPO and Tribes for review and concurrence under Section 106 consultation under the NHPA in a letter dated August 17, 2011. SHPO provided a letter of concurrence on August 26, 2011 (with the exception that SHPO determined the farmhouse at TTCW8 associated with the farmstead was ineligible, and the barn associated with TTCW8 was individually eligible) and requested mitigation to help offset the visual impact of the Project on the eligible property. In order to satisfy the mitigation requirement, TVA, the Developer, and SHPO entered into a Memorandum of Agreement (MOA) on November 28, 2011 whereby the Developer would implement a number of treatment plan stipulations. The stipulations in the MOA are discussed in Chapter 4.4 and 5.4.

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 agricultural land use (88.4%) with few areas of undeveloped grassland/herbaceous vegetation (7.3%) (Figure 3-5; Table 3-3). Agricultural lands are used for cultivated crops, primarily wheat, corn, sorghum, and soybeans but also milo, hay, and sunflower. The Project is located within the rural, unincorporated portion of Gray County outside of city limits. Residences and farm buildings occur along road frontages at a relatively low density (Figure 2-3; KDOT 2008).

Table 3-3. Land Use in Project Area

NLCD Land Cover Type	Acreage in Project Area	Percentage of Project Area
Cultivated Crops	12,277	88.42
Grassland/Herbaceous	1,007	7.25
Pasture/Hay	350	2.52
Developed, Open Space	205	1.48
Open Water	34	0.24
Deciduous Forest	8	0.06
Barren Land	3	0.02
Developed, Low Intensity	1	0.01

Source: NLCD 2006

The Project Area occurs within the AG-Agricultural District established by the Gray County Zoning Ordinance. The zoning regulations do not include provisions specific to wind energy projects; however, the Project is allowed as a conditional use in the AG District. The Project applied for and received a Conditional Use Permit from Gray County in October 2009, May 2010, and March 2011 for all property necessary for the construction of the Project. While the county zoning ordinance does not specify required setbacks for wind energy projects, CPV has adopted a 1,000-ft setback from residences on land under Easement Agreement with CPV and a 2,000-ft setback from residences outside the Project Area (Figure 2-3).

There are no other existing or planned industrial developments within the Project Area. The nearest existing wind energy facility is the NextEra Energy Resources Gray County Wind Energy Facility located 16 mi south of the Project in Gray County. A new wind energy project, the Cimarron II Windpower Project owned by Duke Energy Renewables, is proposed approximately 0.5 mi west of the Project. Existing and proposed wind energy projects in the vicinity of the Project are discussed in more detail in Chapter 4.0. The existing 345-kV Sunflower transmission line traverses east-west through the northern portion of the Project Area. The Burlington Northern and Santa Fe (BNSF) Railway traverses through Gray County along U.S. Route 50 approximately 3 mi south of the Project. The BNSF Railway actively operates through several western states, transporting agricultural products, coal, consumer products, and industrial products (BNSF Railway 2011).

The Farm Service 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 ten-year intervals.

Figure 3-5
Land Use

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Project Layout
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Barren Land
- Deciduous Forest
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops

Source: Layout v4.2, NLCD.

N

0 0.25 0.5 Miles

KANSAS

Project Location

TETRA TECH EC, INC.

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3.6. Recreational Resources

Recreational opportunities in Gray County include hunting, hiking, biking, four-wheeling, and other outdoor activities (City of Cimarron 2011). Recreational opportunities within the Project Area are limited and can be found mainly in the vicinity of the City of Cimarron approximately 3 mi south-southwest from the Project. The Cimarron Golf Club is a United States Golf Association and Professional Golf Association sponsored golf course located in northern Cimarron. The Cimarron Crossing Park located south of the City of Cimarron near the Arkansas River offers opportunities for hiking, camping, and baseball.

Farther from the Project, the Santa Fe Trail Museum of Gray County is located in Ingalls, Kansas approximately 6 mi west of the City of Cimarron. The historic Santa Fe Trail follows through present day Cimarron near the Arkansas River. The Cimarron Crossing Park has two markers describing the trail near Cimarron (Gray County 2011). Chapter 3.4 provides further discussion of the Santa Fe Trail. The Boot Hill Casino and Resort is located in Ford County approximately 10 mi southwest of the Project in Dodge City, Kansas.

There are no state or federal parks, wildlife management areas (WMA), or other protected public lands offering recreational opportunities within Gray County (Figure 3-6). The nearest public recreational lands to the Project are over 15 mi from the Project, and include the Ford County State Park (also a State Fishing Lake and Wildlife Area) and Hain State Fishing Lake and Wildlife Area in Ford County, the Hodgeman County State Park (also a State Lake) in Hodgeman County, and the Finney State Fishing Lake, Concannon State Fishing Lake, and Finny County Game Refuge in Finney County.

3.7. Visual Resources

The visual landscape of the Project Area is a rural flat landscape with agricultural row crop production and limited residential development along road frontages. The horizon is visible for several miles with the agricultural landscape changing throughout the year from tilled soil to crop fields. Existing features in the viewshed for the Project Area include linear features of highways and county roads, overhead electrical transmission lines, homesteads, fencing, and tree vegetation delineating field boundaries (Figure 3-7). There are no federal or state scenic byways in the vicinity of the Project (Kansas Byways 2011; America's Byways 2011),

The APE for historic architectural resources survey described in Chapter 3.4 and shown on Figure 3-4 serves to assess visual effects to potentially NRHP-eligible cultural properties in consultations with SHPO and other consulting parties.

3.8. Noise

The Project Area is rural and mainly consists of agricultural land (wheat, corn, milo, and soybean) with some fallow land and small feed lots. There are a few scattered residences and working farms throughout the Project Area. Transportation routes within the Project Area include Kansas State Route 23 (KS-23) and U.S. 400/U.S. 50. Other sound sources include the Cimarron Municipal Airport south of the Project Area and the 345-kV Sunflower transmission line that bisects the Project Area.

Finney Co.

Finney State Fishing Lake

Concannon State Fishing Lake

Finney County Game Refuge

Hodgeman Co.

Hodgeman County State Lake

Hodgeman County State Park

Hain State Fishing Lake and Wildlife Area

Ford State Fishing Lake and Wildlife Area

Ford County State Park

Gray Co.

Haskell Co.

Ford Co.

Figure 3-6
Public Lands and Easements

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- County Boundary
- State Park
- Protected Area

Source: ESRI, KS Biological Survey.

N

0 2.5 5 Miles

KANSAS

Project Location

TETRA TECH EC, INC.

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October, 2009

June, 2009

November, 2010

May, 2011

Figure 3-7
Photographs of Typical Landscape

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

TETRA TECH EC, INC.

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Existing ambient sound levels are expected to be relatively low, although sound levels may 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 are likely to 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 the soundscape.

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, may contribute to this masking effect. The latter is most prevalent in rural and suburban areas with established tree stands and mature crops. In colder climates, wintertime defoliate conditions typically have lower background sound levels due to reduced outdoor activity, resulting in lower wind masking effects. During seasonally 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.

3.9. Air Quality and Climate Change

The USEPA and the KDHE regulate air quality in Kansas 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 (specific concentrations in ambient air) have been established by USEPA 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 (less than 10 microns and 2.5 microns in size, respectively) can cause respiratory problems, especially to 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.

Kansas has codified its air quality regulations in the Kansas Administrative Regulations (KAR) Article 28-19. Under KAR 28-19-200, Kansas has adopted by reference the federal NAAQS as defined under Title 40 of the CFR Part 50. Kansas has not adopted any state-specific ambient air quality standards. The applicable NAAQS must be maintained throughout construction and operation of the wind project.

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 2011). The entire Project Area and region within 300 km of the Project Area is designated as Class II. The nearest Class I areas are the Wichita Mountains Wilderness, approximately 230 mi (370 km) south-southeast of the Project Area, and Great Sand Dunes National Park, approximately 280 mi (450 km) west of the Project Area.

3.9.1. Existing Conditions

The entire state of Kansas currently is in attainment of the NAAQS for all criteria pollutants. 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.

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 CAA (USEPA 2009a). 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).

Although the issue is subject to scientific debate, these six specific GHG are considered by USEPA to be the primary cause of human-induced climate change 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, 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

Gray County encompasses 868.9 mi^2 and is located in southwestern Kansas adjacent to Ford, Hodgeman, Finney, Haskell, and Meade Counties, Kansas. In 2010, the U.S. Census Bureau

reported that Gray County had a relatively low population density of 6.9 persons per mi^2 and a population of 6,006, which is a 1.7 percent increase from the 2000 population of 5,904 persons. In 2010, the U.S. Census Bureau reported that 84.1 percent of the population was composed of white persons who are not of Hispanic or Latino origin. As of 2010, the median age in Gray County was 34.7 years. Approximately 69.6 percent of the population was 18 years and over, 12.7 percent were 65 years and older and only 8.5 percent were under five years of age (U.S. Census Bureau 2010a; U.S. Census Bureau 2010b).

In 2009, the U.S. Census Bureau estimated that the median household income for Gray County was $47,710, and that 9.1 percent of individuals were living below the poverty level. The U.S. Census Bureau estimated the homeownership rate between 2005 and 2009 at 77.5 percent. In 2010, there were 1,570 owner-occupied homes and 583 renter occupied homes in Gray County. The median value of owner-occupied homes was $76,000 in 2000 (U.S. Census Bureau 2000a; U.S. Census Bureau 2010a).[2]

The labor force in 2000 comprised 2,921 individuals, or 68.8 percent of the population 16 years and older. There were 93 individuals, or 2.2 percent, that were unemployed. The primary industries in Gray County are agriculture, forestry, fishing and hunting, and mining, which accounted for 23.6 percent of employment by industry in 2000, followed by educational, health and social services (19.1%), and retail trade (9.1%) (U.S. Census Bureau 2000a).

Agriculture is a large part of the economy for Gray County. According to the USDA, there were 473 farms in Gray County in 2007 that averaged 1,155 acres per farm, for a total of 546,118 acres (853.3 mi^2) of farmland in the county (98% of the county land area). In 2007, Gray County ranked fourth in the State of Kansas in total value of agricultural products sold. The total market value for agricultural products produced was $691,381,000, which averaged $1,461,694 per farm. The total market value increased by 96 percent from 2002 to 2007, while the amount of land in farms increased by 9 percent during the same five year period. Livestock sales accounted for 84 percent of the total market value, while crop sales accounted for 16 percent (USDA 2007). Agricultural lands (crop and pasture/hay) comprise approximately 91 percent of the Project Area (Table 3-3).

According to the USDA Census of Agriculture (2007), the top crop item for Gray County is wheat for grain (109,443 acres), followed by corn for grain (68,839 acres), sorghum for grain (58,891 acres), forage land for hay and haylage, grass, silage, and greenchop (30,760 acres), and soybeans for beans (7,665 acres). Cattle are the primary livestock in Gray County. There are no feedlots or concentrated animal feeding operations within the Project Area (KDOT 2008).

The NRCS mapped soil units (also see Chapter 3.1) within the Project Area consist mainly of prime farmland and farmland of statewide or local importance (Figure 3-8). 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 Gray County that occur within the Project Area are presented in Table 3-4. As discussed in Chapter 3.5, most of the Project Area is already cultivated for crop production, and as such, most of the available prime farmland and farmland of statewide importance within the Project Area is already cultivated.

[2] As of the writing of this EA, the data from the 2010 census released by the U.S. Census Bureau for Kansas includes only Summary File 1, which does not provide income or employment data.

Figure 3-8
Prime Farmlands

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

- Project Area
- Project Layout
- Prime Farmland
- Prime Farmland if Irrigated
- Farmland of Statewide Importance

Source: Layout v4.2, USDA SSURGO database for Gray County, KS. 2008

N

0 0.25 0.5 Miles

KANSAS

Project Location

TETRA TECH EC, INC.

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Table 3-4. Prime Farmland Soils in Gray County

Soil Unit	Prime Farmland	Prime Farmland If Irrigated	Farmland of Statewide Importance	Area (acres)	Percentage of Project Area (13,883 acres)
Harney silt loam, 0 to 1 percent slopes	X			3,421	24.6
Richfield silt loam, 0 to 1 percent slopes		X		319	2.3
Richfield silt loam, 1 to 3 percent slopes		X		901	6.5
Spearville complex, 1 to 3 percent slopes, eroded	X			434	3.1
Spearville silty clay loam, 0 to 1 percent slopes	X			6,712	48.3
Uly-Coly silt loams, 3 to 6 percent slopes, eroded			X	59	0.4
Uly silt loam, 1 to 3 percent slopes		X		607	4.4
Ulysses silt loam, 3 to 6 percent slopes		X		730	5.3

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 Gray County. Generally, trees are limited in the Project Area and are associated with drainages and shelter belts around homesteads, which have limited economic value.

3.11. Transportation

3.11.1. Roads

The existing roadway infrastructure within the Project Area consists of county roads generally following section lines, comprised of stone, gravel, and unpaved material (KDOT 2008). No federal or state highways are located within the Project Area. The closest highways include State Highway 23, which runs north-south 0.5 mi west of the Project Area, and U.S. Route 50, which runs west-east approximately 2 to 3 mi south of the Project through the City of Cimarron. U.S. Route 50 coincides with U.S. Route 400 along this portion of the highway.

As noted in scoping comments from the KDOT, the KDOT is planning improvements to U.S. Route 400 that include a 3.2 mi corridor from the junction with U.S. Route 50/400 to the junction with U.S. Route 56. The project involves constructing a two-lane divided highway on four-lane right-of-way as an upgradeable expressway, including overpasses, access roads, and two interchanges on new alignment (KDOT 2005). The proposed improvement corridor marginally intersects with the east half of Section 29 in Township 25S, Range 27W near the southwestern boundary of the Project Area. The proposed improved road itself would be located outside of the Project Area.

3.11.2. Traffic

Existing traffic volumes on the state highways and major county roads in the vicinity of the Project are presented in Figure 3-9. 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 KDOT (KDOT 2010; KDOT 2011a). For the purposes of comparison, the functional capacity of a two-lane paved rural highway is approximately 5,000 vehicles per day. The rural state highways in the vicinity of the Project Area carry levels of traffic that are fairly typical for southwestern Kansas (KDOT Districts 4 and 5) where most of the roads have an average daily vehicle count ranging from approximately 1,000 to 7,000 vehicles per day, with only a few highways averaging over 10,000 vehicles per day (KDOT 2011b). Table 3-5 summarizes the existing traffic levels for rural highways in the vicinity of the Project.

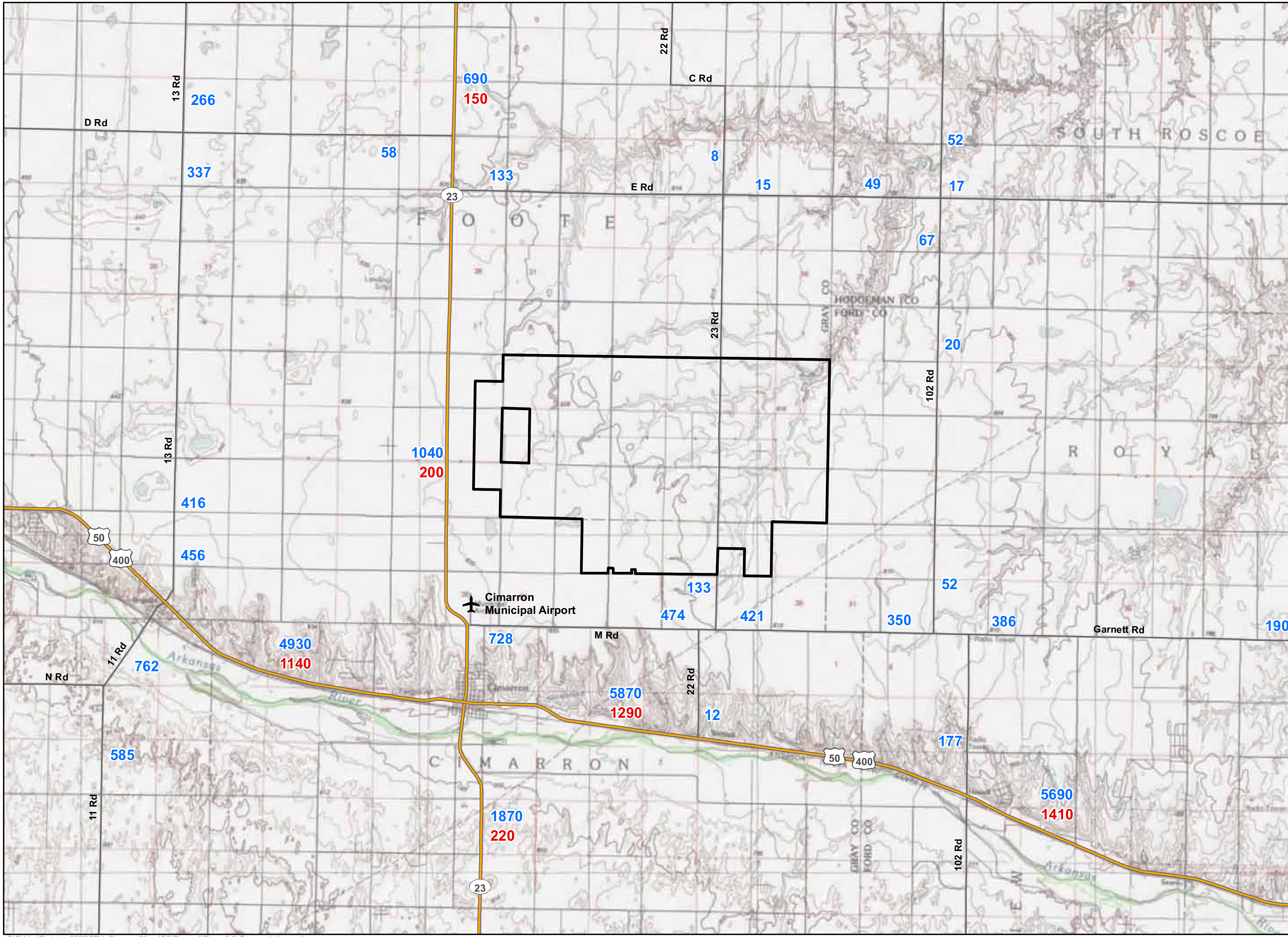


Figure 3-9
Transportation

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Legend

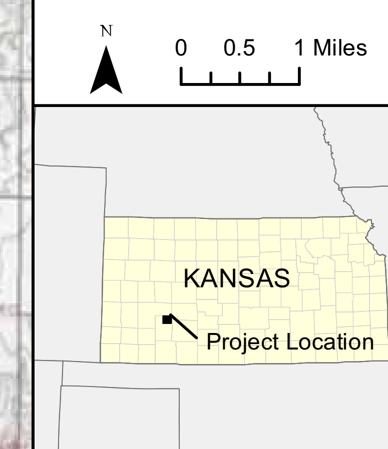
Project Area

Major Roads

Local Roads

550 Average Annual Daily Traffic

90 Commercial Truck Traffic



TETRA TECH EC, INC.

Table 3-5. Existing Daily Traffic Levels

Roadway Segment	AADT/Commercial Truck Traffic
Highway 23 north of Cimarron	1,040 / 200
Highway 23 south of Cimarron	1,870 / 220
Highway 50/400 east of Cimarron	5,870 / 1,290
Highway 50/400 west of Cimarron	4,930 / 1,140
Highway 50/400 east of the Gray/Ford County line	5,690 / 1,410

Source: KDOT 2010; KDOT 2011a.

3.11.3. Air Traffic

One general aviation airport is located within 10 mi of the Project Area, the Cimarron Municipal Airport located 2 mi north of the City of Cimarron approximately 1.5 mi southwest of the Project (Figure 3-9). The Cimarron Municipal Airport has two runways at an approximate elevation of 2,752 ft above sea level, one asphalt runway in good condition oriented north-south and one turf runway in poor condition (AirNav 2011). There are no published instrument approach procedures for the Cimarron Municipal Airport. The Ingalls Municipal Airport is located approximately 10 mi west of the Project. The nearest commercial airports to the Project are the Dodge City Regional Airport and the Garden City Regional Airport.

3.12. Communication Resources

Telecommunications infrastructure and services that could potentially be affected by the construction or operation of a wind energy project include underground telephone and fiber optic cables, amplitude modulation (AM) and frequency modulation (FM) radio broadcasts, off-air television, microwave transmission, and 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.

Two privately operated microwave beams paths cross the northeastern corner of the Project Area (Figure 2-3). These beam paths are licensed to Rocking M Radio, Inc. and Radioactive, LLC. There are no AM or FM radio stations within the Project Area. The nearest AM station antenna are located in Dodge City. The nearest FM stations are located approximately 2 to 3 mi to the north of the Project Area, to the southwest near Ingalls, and to the southeast near Dodge City. There are no LMR stations within the Project Area. LMR stations are mainly located near the City of Cimarron and along the state highways. Project planning has explicitly considered these services and sought to minimize impacts in the siting of turbines and other Project components. The telecommunications studies conducted by Comsearch are attached as Appendix O.

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 source of existing EMF within the Project Area is likely the existing high voltage 345-kV Sunflower transmission line that traverses the Project Area from east to west north of J Road. Other overhead lines in the Project Area are limited to lower voltage distribution lines.

3.13.2. Hazardous Materials / Hazardous Waste

The Project Area is located in a relatively rural area of Kansas 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 October 9, 2009. The EDR database 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 E 2247-08 ("Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property") using a database maintained by an independent consultant.

Other than one aboveground storage tank (AST), the EDR review did not identify any mapped environmental records within the Project Area. 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 KGS (2011a) indicates that there are no active oil or gas production facilities within the Project Area although this is a common activity in the general Project vicinity.

Since the completion of the EDR database 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 has been performed by the Developer dated October 19, 2011 to identify and assess thoroughly any recognized environmental conditions (RECs) that may exist, which included a site reconnaissance and updated EDR report. The findings of the Phase I ESA show that existing RECs, particularly within farmsteads, are not likely to affect the Project due to the distance between the RECs and the layout of Project components (i.e., CPV's internal easement agreements restrict Project development to no closer than 1,000 ft to farmsteads within the Project Area).

3.13.3. Security

The Project is located in an area that has a relatively low population density (U.S. Census Bureau 2010a) and crime rate (CLR 2010). 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 controlled and 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 southwestern Kansas. Homesteads and farms within the Project Area, and small towns nearby, are served by an established transportation and utility network. The closest towns and major cities to the Project Area are the City of Cimarron (3 mi to the south) and Ingalls (6 mi to the southwest) in Gray County, Dodge City in Ford County (15 mi to the southeast), and Garden City in Finney County (28 mi to the northwest). Garden City has the largest population with 28,451 people, followed by

Dodge City with 25,176 people, then Cimarron with 1,934 people and finally Ingalls, with 328 people (U.S. Census Bureau 2000b).

The City of Cimarron is the county seat of Gray County. The city provides electric, water and sewer utility services, as well as recycling, hazardous waste disposal and composting facilities. Municipal waste services are provided through the Gray County Disposal Service. Chapter 3.6 also discusses local recreational facilities (City of Cimarron 2011). The Gray County Sheriff's office is located within the City of Cimarron and provides four full-time and one part-time dispatcher, two patrol sergeants, one master deputy, and five deputies. Firefighting emergency services in Gray County include the Cimarron Volunteer Fire Department and the Gray County Rural Fire Department in Cimarron, Kansas and the Montezuma Fire Department south of the Project Area in Montezuma, Kansas. The primary healthcare facilities are located in surrounding counties. The Western Plains Medical Complex in Dodge City, Kansas and the St. Catherine Hospital in Garden City, Kansas provide emergency and routine medical services and surgical procedures.

3.14.2. Electrical Service

One existing high voltage transmission line, the Sunflower 345-kV line, passes through the Project Area. The Victory Electric Cooperative Association provides electrical service to most of Gray County. Other lines in the Project Area are limited lower voltage overhead distribution lines.

3.14.3. Water Supply

The Project Area is located entirely within an unincorporated, rural portion of Gray County. Water supply within the Project Area is provided primarily from private groundwater wells. The City of Cimarron also operates groundwater wells to supply water to city residents (Denney 2011, *pers. comm.*).

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 minority and low-income population groups was based on demographic data from the 2000 and 2010 Census. 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 Council on Environmental Quality (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 2010 Census data, the Project Area is within Block Group 1 of Census Tract 9626, which encompasses all of Foote Township and had a total population of 99 individuals. Of these individuals, 83 considered themselves white, not Hispanic or Latino (84%) with a resulting minority population of 16 percent. The minority population in 2010 in Gray County was 15.9, compared to 21.8 percent in the State of Kansas.

According to the guidance (CEQ 1997), low-income populations in an affected area should be identified with poverty thresholds from the Census Bureau. The 2000 Census data for Census Tract 9626 in Foote Township indicates that 5 percent of the population near the Project Area (5 out of 99 individuals) is below the poverty level, compared to 9.1 percent in Gray County overall and 9.9 percent in the State of Kansas.

No Native American Reservations, which could represent minority and low-income populations in the region, were identified in Gray County or any adjacent counties.

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 Gray, Ford, Hodgeman, and Finney Counties. This area was an appropriate spatial scale for most resources based on several factors, including precedent set by comparable projects which have undergone environmental review, as well as the ability to identify 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 and transmission lines, 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. Two ethanol power plants are located approximately 25 mi northwest of the Project near Garden City in Finney County, Kansas (KDA 2011); however, given the distance from the Project and because these existing facilities do not have similar resource impacts, these facilities are excluded from the cumulative impacts analysis.

TVA considers “reasonably foreseeable” future wind projects as those for which there have been some discernible commitment of resources in furtherance of an announced project. This would include application for or receipt of local, state, or federal permits, the acquisition of property rights or equipment to support the project, executed PPAs or take-off agreements, actions to acquire necessary transmission services, or commencement of construction activities. TVA is aware of ten wind energy and transmission facilities within the analysis area, including three existing facilities and seven reasonably foreseeable future facilities (Figure 4-1).

Figure 4-1
Existing and Foreseeable Projects

Final Environmental Assessment
Cimarron Wind Energy Project - Phase 1
Gray County, Kansas

CPV Renewable Energy Company, LLC

Finney Co.

Hodgeman Co.

Gray Co.

Ford Co.

Haskell Co.

Duke Energy Renewables
Cimarron II Windpower Project

enXco Spearville
Wind Energy Facility

KCPL
Spearville
Wind Farm
Expansion

Duke Energy Renewables
Ironwood Wind Project

Finney County
Wind Project

NextEra Energy Resources
Gray County Wind Energy Center

NextEra Gray County
Wind Energy Center Expansion

Horizon Wind Energy
Western Trails Wind Project

Legend

- Project Area
- 25-mile Project Area Buffer
- ITC Great Plains KETA Transmission Line
- ITC Great Plains V-Plan Transmission Line
- Existing and Foreseeable Wind Projects

Source: Kansas Natural Resource Planner, ITC Great Plains.

N

0 2.5 5 Miles

KANSAS
Project Location

TETRA TECH EC, INC.

Z:\Gdrive\Projects_2008\CPV_Cimarron\Maps\EA\Phase_1\Figure3-3_Veg.mxd

The existing facilities are:

- NextEra Energy Resources' Gray County Wind Energy Center, a 112.2 MW project in operation since 2001 that consists of 170 Vestas V-47 wind turbines, located approximately 16 mi south of the Project (Kansas Energy Information Network 2011; NextEra Energy Resources 2011).

- EnXco's Spearville Wind Energy Facility, a 100.5 MW project in operation since 2006 that consists of 67 GE 1.5 MW turbines, located approximately 25 mi east of the Project in Ford County (enXco 2006).

- KCPL's Spearville Wind Farm Expansion, a 100 MW expansion in operation approximately 23 mi east of the Project in Ford County. A portion of the wind turbines were installed in 2010 (Kansas Energy Information Network 2011, Shriwise 2011 *pers. comm.*).

The reasonably foreseeable future projects include:

- Duke Energy Renewable's Cimarron II Windpower Project, a proposed 132 MW project located approximately 0.5 mi west of the Project in Gray County. The project has a signed PPA with Kansas City Power and Light (KCP&L) and is expected to begin operation in 2012 (Kansas City Business Journal 2011).

- NextEra Energy Resources Gray County Wind Energy Center Expansion, a proposed expansion of the existing wind farm that would consist of an additional 67 1.5 MW turbines east of the current turbines (16 mi south of the Project) and a 13.5 mi transmission line to transport the energy to a transfer station in Ford County. The project obtained a Conditional Use Permit from Gray County in 2011 (Garden City Telegram 2010; Denney 2011 *pers. comm.*).

- Westar and Duke Energy Renewable's Ironwood Wind Project, a proposed 500 MW project located approximately 26 mi east of the Project in Ford and Hodgeman Counties. Ironwood Windpower, a subsidiary of Duke Energy, plans to commence construction in 2011 for the first 168 MW consisting of 73 Siemens 2.3 MW turbines (Kansas Energy Information Network 2011; Dodge City Daily Globe 2011).

- Finney County Wind Project, a proposed 405 MW project that entered the SPP queue for a feasibility study in early 2008 with a proposed on-line date of December 2012, located approximately 32 mi west of the Project (Kansas Energy Information Network 2011).

- Horizon Wind Energy's Western Trails Wind Project, a proposed project that would generate up to 400 MW located approximately 40 mi southeast of the Project in Ford and Kiowa Counties. The project obtained a Conditional Use Permit and approval for the project development plan from Ford County in 2008 (Dodge City Daily Globe 2008, Hutchinson News 2010).

- ITC Great Plains Spearville-Axtell Transmission Line, also known as the KETA Project, is a 215-mi, 345-kV transmission line currently under construction. The line would run north from Spearville in Ford County, Kansas to Axtell, Nebraska. The

nearest portion of the transmission line to the Project is approximately 25 mi east of the Project at the Spearville substation endpoint (ITC Great Plains 2011).

- ITC Great Plains V-Plan Transmission Line, a proposed transmission line through Ford County that would run south from Spearville in Ford County, Kansas and east to Wichita, Kansas developed by ITC Great Plains, Sunflower Electric Corporation, and Mid-Kansas Electric Company. The nearest portion of the line would be located approximately 20 mi east of the Project where the line turns south approximately 5 mi east of Dodge City. The project has negotiated a road maintenance agreement with Ford County and filed a route application with the Kansas Corporation Commission in March 2011 (Docket 11-ITCE-644-MIS). Construction of the project is anticipated to begin in Spring 2013 (ITC Great Plains 2011).

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

Impacts of the proposed Project to the existing condition of geologic resources, topography, and soils within the Project Area are likely to be limited. Concerns such as bedrock blasting, impacts to major commercial mineral extraction facilities, and geologic hazards are not expected to apply to the Project. The potential for temporary surface disturbance during construction to result in soil loss is low. The likelihood of processes such as mixing of soil and subsoil, compaction, erosion, or mass failure is minor due to the fact that construction activities would generally be conducted in areas that are not underlain by sensitive or highly productive soils. The greatest impacts to soils from the Project are likely to include potential wind erosion during the period following construction and prior to reestablishment of vegetative cover, and permanent removal of approximately 56 acres of soils from potential agricultural production by occupancy of Project components.

4.1.1.1. Geology and Topography

Impacts of the proposed Project to available geologic resources are likely to be limited. Due to the thickness of surficial materials, excavation or blasting of bedrock is extremely unlikely. In the event that active commercial sand and gravel extraction facilities are present within the Project Area and cannot be avoided, CPV would coordinate with landowners regarding impacts and any necessary mitigation. 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.

4.1.1.2. Soils

Based on the Project layout, estimated impacts to soils in the Project Area include approximately 249 acres of temporary disturbance during Project construction and approximately 56 acres of permanent disturbance due to occupancy by Project components. These areas represent 1.8 percent and 0.4 percent of the Project Area, respectively.

During the scoping process, a comment was 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 (2%) of the temporary construction footprint. Total temporary impacts to soils characterized as "all hydric" are expected to be less than 5 acres. An additional 276 acres of soils characterized as "partially hydric" are also within the temporary impacts of 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 minor. Temporary impacts to prime farmland would be approximately 247 acres, of which approximately 44 acres would be permanently converted. There would be temporary impacts to farmland of statewide importance on approximately 0.2 acre of the Project footprint, of which 0.1 acre would be permanently converted. The NRCS determined that the Project required completion of Form AD-1006 due to proposed conversion of farmland to nonagricultural uses, as defined in the Farmland Protection Policy Act (Appendix B). TVA responded to the request by submitting the necessary information for Form AD-1006 for Farmland Conversion Impact Rating to the NRCS. The combined relative value and site assessment scores of the impacts to prime farmland is below the 160 points required for further involvement by the NRCS.

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 90 percent of the soils within the total Project footprint, including temporary and permanent impacts (305 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.

4.1.1.3. Cumulative Effects

Development of the proposed Project and other existing or reasonably foreseeable future wind energy facilities is expected to have minimal impact on geology, topography, and soils within the cumulative impacts analysis area. The proposed Project is anticipated to have very limited effects on geologic resources, and impacts to 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 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

4.2.1.1. Surface Waters and Floodplains

All mapped streams on the USGS National Hydrography Dataset (USGS 2010) and the USFWS NWI were examined in the field during spring and fall 2011 delineation surveys. The survey spanned a corridor greater than the construction footprint in order to be conservative (see Appendices C and D).

The field surveys identified five drainages that would be crossed by the Project as ephemeral features that do not meet USACE criteria for waters of the U.S. Each of the drainages listed in Table 4-1 and shown in Figure 3-2 lacks a continuous defined channel; however, these drainages exhibit channel characteristics (bed and bank) for stretches of several yards beyond which, the channel features disappear into a barely defined erosional features or swales. Although these unnamed drainages are marginal in terms of meeting the characteristics of a state-jurisdictional stream, they are prominent drainages within this generally flat sub-basin and drain more than 640 acres each, and so they are deemed likely jurisdictional by the KDA. Appendices C and D contain the results of the field-based wetland delineations of the Project.

Many USGS mapped blue line streams were observed in the field as “non-stream” features, or relict streams, where stream features had been lost by decades of plowing, cropping, and contour-smoothing. These relict drainages typically lacked any indication that flow is concentrated for more than a few yards; rather, precipitation directly infiltrates or is conveyed to lower areas by sheet flow. Some of the relict drainages exhibit swale-like morphology but lack a surface water connection with other waters.

Table 4-1. Stream Crossings within the Project

ID	Drainage	Linear Ft	Average Channel Width (ft)	Observed Channel Depth	Meets KDA Criteria for State Jurisdiction (Yes/No)
B	South Fork Buckner Creek	33.88	2-3	Dry	Yes
C	South Fork Buckner Creek	74.85	3-4	Dry	Yes
F	South Fork Buckner Creek	115.60	3-4	Dry	Yes
G	Unnamed Tributary of South Fork Buckner Creek	33.38	1-2	Dry	No
H	South Fork Buckner Creek	125.50	3-4	Dry	Yes

Any significant modification of a state jurisdiction stream or its floodplain requires prior approval from KDA per the Obstructions in Stream Act, the Levee Law, and associated regulations. At a meeting with CPV and in July 2009, KDA outlined the Stream Obstruction Permit application requirements which must include a plan profile/cross-section for each individual crossing, and a hydrological analysis among other accompanying information. CPV plans to submit these applications at least three months prior to construction to ensure appropriate review time for issuance of the permits.

4.2.1.2. Wetlands

The Project would temporarily affect approximately 1.5 acres of isolated, non-jurisdictional wetlands during construction, and permanently impact approximately 0.3 acre of isolated, non-jurisdictional wetlands during operation (Table 4-2). A 2011 study of playa systems indicates there is little groundwater connection between playas, and hydrologic inputs are primarily from direct precipitation and runoff (Bowen 2011). Based on careful examination in the field, none of the delineated wetlands appear to have a hydrologic connection (i.e., significant nexus) to a traditional navigable waterway (Appendices C and D). Figure 3-2 shows the distribution of wetlands crossed by the Project. Project facilities have been designed to avoid wetland resources whenever possible.

Table 4-2. Wetlands Identified within or Proximal to the Project

Wetland ID	Cowardin Class	Size within Study Corridor (acre)	Estimated Temporary Impacts (acre)	Estimated Permanent Impacts (acre)
II	PEM	1.93	1.1	0.30
KK	PEM	0.15	0.05	0
MM	PEM	0	0	0
NN	PEM	0	0	0
QQ	PEM	0.05	0.04	0
SS	PEM	<0.01	0	0
TT	PEM	0	0	0
UU	PEM	0	0	0
VV	PEM	0	0	0
WW	PEM	0	0	0
W	PEM	0.01	0	0
XX	PEM	0	0	0
XX-1	PEM	0.11	0.07	0
ZZ	PEM	0.33	0.1	0
AAA	PEM	0.43	0.14	0

4.2.1.3. Summary of Environmental Consequences on Surface Waters, Floodplains and Wetlands

Construction of the Project would affect five ephemeral waters and 6 wetlands; but only 0.3 wetland acres of non-USACE jurisdictional wetlands would be permanently impacted. The duration of construction is less than 12 months, and most surface waters or wetlands in the Project would be affected for only a portion of this construction period. Areas disturbed by construction would be restored to grade and revegetated with native seed or as specified by the local NRCS staff. Areas under crop would be restored and revegetated as per the landowner's request.

Project facilities have been designed to avoid impacts on surface water, floodplain and wetland 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 disturb land and, therefore, potentially impact surface water runoff within the Project Area. Construction and operation of the Project may affect surface water drainages 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.

Because the Project would disturb more than 1 acre of land, a NPDES permit for stormwater runoff is required. As described in Chapter 2.1.2, the Developer has committed to using BMPs and implementing mitigation measures that would be outlined in its SWPPP to avoid, minimize and mitigate for potential impacts to surface waters affected by the Project. These plans would be developed as part of the NPDES permit process closer to Project construction. With implementation of these features and measures described, effects to surface waters and wetlands 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. 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 Project would avoid flood-prone areas and water bodies to the extent practicable. It is unlikely that the Project would impact floodplain resources and any potential impact would be minor. Therefore the Project complies with the requirements of EO 11988 Floodplain Management.

4.2.1.4. Groundwater

Water would be necessary during construction for use in dust suppression as well as in the production of concrete at the on-site batch plant. CPV would not drill a new well to obtain this water, but may consider obtaining water from an existing well, in agreement with the water right owner and as permitted by the KDA. All necessary water appropriation and use permits would be obtained in consultation with the KDA prior to 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.

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

During Project operations, domestic water use would be necessary at the O&M facility. Source water has not yet been decided but would be obtained in compliance with the KDA water appropriation and use permits. Process or domestic wastewater generated during Project construction and operations that are not directed to a city sanitation sewer may require issuance of a State Water Pollution Control Permit. CPV would consult with the KDHE prior to construction and operations to determine the applicability of this permit. In the event a septic tank and lateral field system is considered for use at the O&M building, only domestic sanitary wasters would be directed to the septic tank. Floor drains or other connections that may introduce nondomestic wastes would be subject to Underground Injection Control (UIC) Class V injection well requirements which are expected to minimize potential impacts appropriately.

Agricultural lands taken out of production during Project construction and operations could affect water right owners. Water right owners are responsible for reporting to the KDA any changes in their place of use and/or reasons for nonuse of water. CPV would advise all affected landowners of this KDA requirement.

4.2.1.5. Cumulative Effects

Cumulative impacts on water resources are expected to be minimal and limited to areas that are affected by other projects located near the Project (Figure 4-1). Runoff from construction activities near water bodies could result in cumulative impacts, although its effect would be expected to be relatively minor and controlled by implementation of BMPs associated with the NPDES permit. No adverse impacts on water resources from the Project are anticipated as the Developer has avoided to the extent practicable or has mitigated any permanent wetland impacts through 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 NPDES permitting and BMPs. 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. As such, no other incremental cumulative effects on water resources from the Proposed Action are anticipated.

There is the potential that cumulative impacts on water bodies and wetlands could result if the Project were constructed concurrently with other projects in the immediate area. Of the identified past, present and reasonably foreseeable future projects that could contribute to cumulative impacts, the Duke Energy Renewables, Cimarron II Windpower Project construction would overlap with this Project. The Cimarron II Windpower Project began construction in the fall of 2011 and is scheduled to achieve commercial operation by June 2012 (Duke Energy 2011). The period of time when construction activities overlap between Duke Energy's project and this Project would be minimal as the Project would begin ground-disturbing activities in December of 2011. Impacts on wetlands and water bodies from construction of these two wind farm projects would be avoided or minimized though implementation of BMPs associated with NPDES permits held by each developer. Therefore, construction and operation of the Project

would not contribute to cumulative long-term impacts on water bodies and wetlands within the region.

CPV has stated that it would obtain the necessary water appropriation and use permits from the KDA prior to construction. Because this process ensures that concurrent projects involving water appropriation and use do not result in significant impacts, no cumulative impacts are anticipated for the construction use of water for dust suppression and production of concrete in association with the batch plant, nor from the operations use of domestic water to supply the O&M building.

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

4.3.1.1. 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 4-3. The operational footprint would result in an estimated loss of approximately five acres of grasslands with the current turbine layout. An additional estimated 23 acres of native grasslands would be temporarily affected during construction using the 72-turbine layout resulting in a total construction impact of approximately 28 acres of grassland disturbance. In areas where disturbance is substantial and natural regeneration of onsite plant propagules would not occur, the temporary loss of habitat would be mitigated by reseeding of the affected areas with native grassland plant species. The spread of noxious weeds during construction is an additional potential impact. 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, would be developed.

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.

Based on the proposed Project layout, eight turbines of the potential 72 turbines are presently sited in grasslands (Turbines B5, B6, B9, B10, B13A, 14A, C25A, and C26A; Figure 3-3). Turbines B5, B6, B9, and B10 are located in planted grasslands that represent the most disturbed cover type of grasslands. Turbines 13A and B14A are located near the edges of

grassland parcels and would therefore be less likely to fragment the habitat. Turbines C25A and C26A are located in the most unfragmented grassland cover type that is dominated by mostly native species. Careful attention was made in micrositing these turbines and associated roadways to minimize impacts to the grassland areas.

Unfragmented areas of grassland in the Project Area may be of greatest benefit to wildlife as they maximize potential population sizes for grassland obligate species and they limit encroachment into grassland habitat of non-grassland influences (i.e., invasive species, predators). Federal (e.g., USFWS) and state (e.g., KDWPT) agencies have requested that, even though construction within grasslands is not regulated, developers should attempt to minimize fragmentation of existing native grassland patches. The Developer did this in its turbine siting plan.

Table 4-3. Estimated Construction and Operation Footprint on Vegetative Cover

Cover Type	Construction Footprint (acres)	Operation Footprint (acres)
Grasslands dominated by mostly native vegetation	8.5	1.7
Grasslands that has been planted	0.0	0.0
Grasslands that may have been planted	13.4	2.3
Grasslands	6.3	1.2
Invaded grasslands	0.0	0.0
Grasslands used as hayfields	0.0	0.0
Grassed waterway	0.0	0.0
Total Grasslands	**28.2**	**5.2**
Crops	**265.1**	**26.1**
Total*	**293.3**	**31.3**

Source: Tetra Tech 2010a
* Total acreage assessed during vegetation field survey is less than total Project Area (13,883 acres) as some parcels (1,093 acres) in the current Project Area were not under Easement Agreement at the time of the Native Grassland Survey.

4.3.1.2. Wildlife

Similar to past development in the Project Area, 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.

One bird species (sandhill crane) exhibited high encounter rates during Spring 2010 surveys (i.e., frequently observed flying at the height of proposed turbines), suggesting the potential for direct impact on these species from turbine collisions. All the sandhill cranes were observed in flight and 61.8 percent of these observations were at RSA height (38.2% were above RSA height). Three separate observations (total of 2,105 birds) were made on one day (March 23, 2010). This coincides with the natural migration period of sandhill cranes that pass through

Kansas during March and April heading north to breeding areas in Canada (Tacha et al. 1992). Generally, sandhill cranes tend to migrate at heights of lower than 1,600 m with 75 percent observed migrating at heights between 150 m and 760 m (Tacha et al. 1992) generally putting migratory individuals above RSA height. The flight height profile of the cranes observed in the Project Area suggests that the flock of about 1,300 birds had either recently taken off from a nearby location, or were searching for a place to land. Given the general lack of suitable wetlands within the Project Area, the former scenario (roosting outside of the Project Area) is more likely. The other group of 790 birds were in flight heading northward at a height of 400 m to 800 m. The third flock (15 birds) was observed heading northward flying at 300 m in height. The combination of limited habitat availability with the observation that no sandhill crane fatality has been reported at wind energy facilities in the United States suggested a low potential for negative turbine interaction. A comparison of avian encounter rates observed in the 2010 spring and fall surveys for the three different turbine RSA's proposed (see Chapter 2.1.4.3) is included in Appendix P.

The Fall 2010 survey had considerably lower mean use than the Spring 2010 survey. One species, Canada goose, was recorded as having a high encounter rate during the Fall 2010 survey. Canada goose mortality has been documented at other wind energy facilities but with fewer than ten fatalities reported at new generation wind farms (Jain et al. 2007, Johnson and Erikson 2010), Canada geese generally appear able to avoid turbines. As a result, any mortality of Canada goose in the Project Area is anticipated to be low.

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 and Swainson's hawks were the most commonly observed raptor species during spring 2010 avian surveys and Swainson's hawk was the most commonly observed raptor species during fall 2010 avian surveys. The Swainson's hawk also had a high encounter rate within the RSA during the fall 2010 survey. Over two-thirds of the Swainson's hawks observed in the fall survey were at Point Count 5 on September 17, 2010 (120 individuals of a total of 174). Field notes taken from the biologist on that day describe a tractor plowing the nearby fields with the Swainson's hawks observed hunting opportunistically behind the tractor either on the ground or in the air over the area. This type of behavior may increase the potential for negative turbine interactions by Swainson's hawks in the Project Area. Both species have been reported as fatalities at existing wind farms (Young et al. 2003, Erickson et al. 2004). The very low encounter rates in the RSA observed in the Project Area for northern harrier suggest that the likelihood of turbine-related fatalities at the Project is low. Nesting raptors within the Project Area included red-tailed hawk, great-horned owl, and Swainson's hawk. Construction and maintenance of the Project could lead to disturbance of nesting raptors within the Project Area. Disturbance of nesting raptors can result in complete desertion of nest, eggs, or young. 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.

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. Direct impacts include increased

injury and mortality due to vehicle collisions and wind turbines. 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 mitigation measures the Developer has built into the Project design (Chapter 2, particularly 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 grassland 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 has been developed in conjunction with TVA and the USFWS. This ABPP includes 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 where possible; and
- In the ongoing consultation with the USFWS under Section 7 of the ESA, committing to multi-year post-construction monitoring.

4.3.1.3. 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 Chapter 2.1.2 and as stipulated in the Biological Assessment (Appendix Q) resulting from the consultation with the USFWS under Section 7 of the ESA. USFWS' concurrence with TVA's determinations in the Biological Assessment dated November 4, 2011 is also included in Appendix Q. 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 (2011b), of the federally listed species known to occur within Kansas, only the whooping crane and lesser prairie-chicken are known from Gray County. Golden eagle, which was observed in the Project Area, was added to the list

below and is protected by the BGEPA. Additionally, the USFWS requested that TVA consult on the piping plover and least tern under Section 7 of the ESA as well.

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. There are no reported incidents of turbine-related crane fatalities of whooping cranes or sandhill cranes, and the Developer is planning to bury collection systems but for one short overhead connection from the substation to the interconnection point, thereby substantially reducing the possibility of a power line collision.

According to the USFWS, the presence of a wind farm could cause whooping cranes to avoid the wetlands in the vicinity of the Project (USFWS 2009; Appendix A and Appendix B). As a result, the proposed action could result in the long-term, indirect impact of the loss of potential roosting habitat. However, given the availability of potential roosting and foraging habitat on the landscape and limited acreage of crane-suitable habitat within the Project Area (Appendix I), it is unlikely that this loss of potential habitat would negatively affect whooping cranes at the individual or population level. No whooping cranes were observed within the Project Area during the spring 2010 (late March – mid-June) or fall 2010 (mid-August to mid-November) point count surveys. However, sandhill cranes were observed migrating north through the Project Area in large numbers in early spring (March) 2010; 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 most of 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 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 several 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 migratory pathway of piping plovers, it is possible that these wetland areas could be used for resting and feeding by piping plovers during migration. In the event that piping plovers utilize the Project Area, the minimization of permanent wetland impacts (i.e., no risk of turbine collisions in wetlands) and the burying of collection systems would minimize potential direct impacts. Available evidence suggests that piping plovers are not prone to collisions with turbines or met 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 piping plover avoidance behavior or lack of susceptibility.

No piping plovers were observed during point count surveys in Spring or Fall 2010. Given the low possibility of collisions by piping plovers with turbines or other Project facilities over the life

of the Project, the Proposed Action may affect but is not likely to adversely affect the piping plover.

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

Least Tern

No least terns were observed within the Project Area during Spring or Fall 2010 point count surveys. No least tern fatalities have been reported at a wind energy facility. The Project Area does not contain habitat that is suitable for least tern breeding. In the event of this species occurring within the Project Area, the minimization of permanent wetland impacts (i.e., no risk of turbine collisions in wetlands) and the burying of collection systems (i.e., elimination of power line collision risk) during Project construction would minimize risk to this species. Therefore, the Proposed Action may affect but is not likely to adversely affect the least tern.

Lesser Prairie-Chicken

Given the land cover within the Project Area and existing large transmission lines and agricultural irrigation pivots, it is unlikely that lesser prairie-chickens use the Project Area for breeding or brood rearing. Native vegetation is limited and isolated and a high-voltage overhead transmission line bisects the Project Area. Given the recent results that show that lesser prairie-chickens may avoid nesting near transmission lines (Pitman et al. 2005), the Project is being developed in an already disturbed area that is of low value to breeding lesser prairie-chickens. The effect of wind turbines on leks and nesting lesser prairie-chickens is currently being studied and results are not yet available. However, Pitman et al. (2005) found that lesser prairie-chicken nests are located significantly farther than expected from anthropogenic features on the landscape in Kansas. Specifically, nests were located a mean of 1,385 m ±60 m SE and 1,254±69 from transmission lines; 1,951±64 and 2,306±53 from buildings; and 1,526±53 and 3,149±202 from improved roads in area 1 (n = 11) and area 2 (n = 8), respectively. Thus, if lesser prairie-chickens show avoidance of wind turbines similar to transmission lines, also a tall structure, then nesting hens associated with the four leks outside of the Project Area should be unaffected. Lesser prairie-chickens could occur in the Project Area during the non-breeding season and use the agricultural areas for foraging. Reduced speed limits, the limited use of overhead power lines, and fence marking proposed by CPV if approved by land owners would limit disturbance to prairie-chickens should they occur. As a result, the Proposed Action may affect but is not likely to adversely affect the lesser prairie-chicken.

Golden Eagle

The overall low encounter rates of golden eagles within the Project Area imply a low likelihood of direct impacts due to turbine collisions as a result of the Proposed Action. No landscape features that would concentrate migrating or wintering eagles, such as ridges or known areas of high prey density (e.g., prairie dog towns), are located in the Project Area, so it is unlikely that the Project Area would attract more than occasional individuals. Indirect impacts as a result of the proposed action would include loss or degraded habitat for hunting during and after construction of the Project. The Project Area has been largely converted to agriculture, and grassland patches that would contain prey for golden eagles are limited and isolated. Given the low mean use of the Project Area and lack of features that would concentrate eagles in the area, the Proposed Action is unlikely to adversely affect the golden eagle. CPV has committed to implementing the ABPP as part of the consultation under Section 7 of the ESA between TVA and USFWS on the Project.

4.3.1.4. Cumulative Effects

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). 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.

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 2007, Fargione et al. 2009). The Project efforts described in Sections 2.1.2 and Chapter 5 - Commitments and Mitigation Measures would result in the Project having a very minor effect.

As noted, past actions described elsewhere in the document, primarily agricultural operations, three existing wind farms within 25 mi, and other development have resulted in a loss of native habitats. There would be an additional incremental 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 may migrate through the area. Additional cumulative disturbances as a result of construction and maintenance of the Project may increase the risk for spreading noxious weeds. Proposed monitoring and mitigation measures to be implemented for this Project in response to monitoring would reduce 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 would take place resulting from construction, operation and decommissioning of Project facilities. 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. Phase II Intensive archaeological field investigations (Tetra Tech 2011b, 2011e) and historic architectural

investigations (Tetra Tech 2011c, 2011d) followed the methodology and guidance provided by SHPO in *Kansas SHPO's Guide to Archaeological Survey, Assessment, and Reports* (KSHS 2010b), SHPO review letters (Weston 2009, 2011a, Zollner 2011), and telephone consultations (Weston 2011b). TVA has consulted with the SHPO for concurrence with TVA's findings and recommendations. No NRHP-eligible archaeological resources were identified in the archaeology APE while one farm complex, TTCW8, was identified within the architectural APE and was recommended as eligible for the NRHP (including the barn on the property which was determined to be individually eligible). TVA consulted with the SHPO regarding the visual effects of the Project to TTCW8. TVA, in consultation with the SHPO, determined that the visual effect would be adverse, and alternative sites for the Project or vegetation screening are not economically or logistically feasible. Therefore TVA has identified measures to mitigate or minimize adverse effects in a MOA which was executed with SHPO and the Developer on November 28, 2011 (Appendix R). The stipulations in the MOA include: entering all 21 architectural resources in the Kansas Historic Resources Inventory online database (completed October 20, 2011); providing a donation to the Kansas Historic Preservation Fund for historic preservation-eligible activities in Gray County; and providing National Register documentation to SHPO on TTCW8.

TVA has also consulted with federally recognized Native American Tribes regarding any cultural properties within the proposed Project's APE that may be of religious and cultural significance and potentially eligible for the NRHP.

Cumulative Effects
Since no potentially significant archaeological sites were identified in the APE, Project construction would cause no cumulative impacts on archaeological resources. 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. TVA, in consultation with the SHPO and interested federally recognized Native American Tribes with whom the agency is coordinating, has worked to avoid adverse effects to NRHP-listed or eligible historic properties wherever possible. Where effects to the one NRHP-eligible historic property TTCW8 could not be avoided (TVA determined alternative sites for the Project or vegetation screening are not economically or logistically feasible), TVA, in consultation with the SHPO and the Developer, identified measures to mitigate or minimize the adverse visual effects through stipulations in the MOA, which was executed with SHPO and the Developer on November 28, 2011.

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 249 acres of land would be temporarily affected during construction activities, and approximately 56 acres of land would be

permanently affected by the footprint of the Project structures. CPV plans to continue working with the landowners during Project development and the ongoing micrositing of the Project facilities to minimize land use disruptions. CPV would also work with landowners to avoid impacts to 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 1,000 ft from residences on land under Easement Agreement with CPV and 2,000 ft from residences not under easement. There would be no displacement of occupied residences or industrial facilities as a result of construction and operation of the Project.

Some CRP land may be impacted by the Project. In those cases, CPV would work with affected landowners and the FSA to have those CRP lands removed from the program. If necessary, CPV would provide compensation to the FSA for any reduction in CRP lands, and through the landowners.

Cumulative Effects
As discussed, the temporary and permanent disturbance from the Project would constitute a minor part of the 13,883 acre Project Area (approximately 1.8% temporarily and 0.4% permanently). The amount of land area that would be permanently altered would constitute only a minute percentage of land currently available in the county and region for similar agricultural land uses. Assuming similar levels of land use effects from other existing or reasonably foreseeable wind farms in the area, the cumulative impact to available agricultural land in the area would also constitute only a minor permanent change in land use for the region. As such, minimal 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.

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.

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

Because there are no designated recreational areas within the Project Area, the Project would not result in any physical intrusion on recreational resources. In general, impacts on nearby recreational areas would be visual in nature as described in Chapter 4.7, primarily affecting individuals using public or private property within or adjacent to the Project Area for hunting, fishing, camping, hiking. The Project would have negligible impacts on existing recreational opportunities near the Project Area, namely the golf course and city parks near Cimarron. The Project is not anticipated to affect recreational opportunities in surrounding counties due to the distance from the Project.

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 nine months).

Cumulative Effects
Cumulative effects on recreational activities near the Project Area would result from visual impacts from the Project and one other proposed wind energy project adjacent to the Project. However, given that nearest turbines from both the Project and the proposed adjacent project would be several miles from the recreational areas identified in Chapter 3.6, any adverse cumulative effects are anticipated to be minor. Visitors at recreational sites near the Project Area are unlikely to view the other existing or reasonably foreseeable projects in Gray County and surrounding counties given their distance from 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 Chapter 3.7, the visual landscape of the Project Area is a rural flat landscape with agricultural row crop production and limited residential development along road frontages. The horizon is visible for several miles with the agricultural landscape changing throughout the year from tilled soil to crop fields. Existing features in the viewshed for the Project Area include linear features of highways and county roads, overhead electrical transmission lines, homesteads, fencing, and tree vegetation delineating field boundaries (Figure 3-7). Visual impacts from the Project would include the addition of physical structures (turbines, a short overhead transmission line, 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.

Nearby visual receptors in the foreground area include 15 occupied homes, the closest of which is approximately 1,000 ft (the setback distance from occupied residences) from a turbine, as well as more distant farmsteads and low-level local traffic typically not engaged in scenic or pleasure driving along the highways, county roads, and municipal roads in the middle ground area. Depending upon terrain and visibility conditions, a portion of the turbines could be seen as minor background elements along the horizon from parts of the City of Cimarron and other areas within Gray 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 view sensitivity

are correlated with where people live and places where people are engaged in recreational outdoor activities or scenic 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 or utilizing local roads.

Since the Project Area does not contain any highly distinctive landscape features, has a low population density, is not frequently accessed other than by 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.

Cumulative Effects
Cumulative visual effects near the Project Area would result from the Project and one other proposed wind energy project adjacent to the Project. However, the potential impacts from the proposed adjacent project are assumed to be similar to the Project given the limited visually sensitive receptors near Cimarron. Assuming that the visual impact from both the Project and the proposed adjacent project would be overall limited and minor, no adverse cumulative effects are anticipated. Cumulative visual impacts with the other existing or proposed wind energy and transmission line projects in the analysis area are anticipated to be negligible due to the distance between facilities, topography, weather 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.

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 the 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.

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

There are no specific noise regulations prescribed by Gray County or the State of Kansas. In the absence of regulations and with few noise sensitive receptors in the Project Area, an acoustic assessment was not required for Project permitting; however, CPV has committed to landowners under agreement that there will be a minimum 1,000-ft setback distance from homes for wind turbines to minimize potential noise impacts at those homes.

Noise would be generated during Project construction and operation. 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 would 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 would 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. Work in the proximity of any single general location would likely last no more than a few weeks. Somewhat longer construction periods could in areas in proximity to construction laydown areas, but these locations would be selected to minimize impacts. Therefore, no single receptor would be exposed to significant noise levels for an extended period.

Sound from an operating wind turbine consists of mechanical and aerodynamic components. Mechanical sound is generated at the gearbox, generator, and cooling fan and is radiated from the surfaces of the nacelle and machinery enclosure and by openings in the nacelle casing. Aside from upset conditions that may result in abnormal mechanical noise emissions, the dominant noise generating component of utility scale wind turbines, such as the models considered for the Project (SWT 2.3-101, SWT 2.3-108, or GE 2.5xl), is aerodynamic. Aerodynamic sound is related to air flow and the interaction with the tower structure and rotor blades when in motion. Wind turbines are unique sound sources as sound is negligible when the rotor is at rest, increases as the rotor tip speed increases, and is generally constant once rated power output and full rotational speed is reached. As an offset, as wind speeds increase, the background ambient sound levels likely would continue to increase by the normal sound of wind blowing through trees and around buildings, resulting in acoustic masking effects.

At the setback distance proposed by CPV, operation of the Project may result in periodically audible sound at receptors under certain operational and meteorological conditions. Specifically, the Project would be audible at the closest receptors relative to the Project, when background sound levels are low and wind speeds high enough for wind turbine operation. Residents outside their houses and with a direct line of sight to an operating wind turbine may hear a gentle swooshing sound characteristic of wind energy facilities. During conditions favorable to sound propagation and very quiet background ambient sound conditions, wind turbines may be periodically audible at distances greater than the setback distance of 1,000 ft. It is expected that the Project would be consistent with sound generated by comparable wind energy facilities sited employing similar setback distances in the Midwest and throughout the United States.

Cumulative Effects

A wind project would need to be located within approximately 2 to 3 km (1.2 to 1.8 mi) of the proposed Project in order to present a possible cumulative influence on sound. There is one wind energy facility nearing construction, Duke Energy Renewables' Cimarron II Windpower Project, which is located within this separation distance and therefore should be considered in the assessment of cumulative effects. As shown in Figure 4-1, the proposed Cimarron II Windpower Project is approximately 0.5 mi west of the Project in Gray County; however, the nearest turbine to a Project turbine is approximately 2 mi west. Operation of the Project and the Cimarron II Windpower Project could potentially result in incremental sound impacts at receptors. If any receptors were to experience these minor incremental sound impacts, it would most likely be those receptors located between the two projects in proximity to wind turbines associated with both projects.

4.8.2. No Action Alternative

The Project would not be constructed. As a result, any potential 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 3.8.

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 expected displacement of some 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 1 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 the SPP, 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 Sunflower, 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, if any, would be from coal-fired versus gas-fired plants, a range for the potential quantity of avoided CO_2 emissions due to the Project has been estimated. Using emission factors published by the USEIA for 2009, each MW-hour of wind power is equivalent to avoiding approximately 1.1 tons of CO_2 emissions from a coal-fired plant, or 0.5 tons of CO_2 emissions from a gas-fired plant. Assuming a year-round capacity factor of 50 percent for the Project (equivalent to 82.8 MW average year-round generation for a 165 MW wind energy generating facility), up to 700,000 tons of coal-fired CO_2 emissions, or up to 310,000 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 for major sources, and because the Project does not meet any other definition of an affected source, the Kansas Air Quality Regulations do 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 (NO_X), CO, SO_2, PM_{10}, $PM_{2.5}$, and volatile organic compounds (VOC). Emissions of hazardous air pollutants from the operation of vehicles and construction equipment would be very small. Construction 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 5.9, 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 watering and dust suppression on roadways, as appropriate.

Operation of the wind turbines would not generate any air pollutant emissions. Because no GHG 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 areas are the Wichita Mountains Wilderness, approximately 230 mi (370 km) south-southeast of the Project Area, and Great Sand Dunes National Park, approximately 280 mi (450 km) west of the Project Area.

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 Gray County, Kansas. 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 Gray 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 $750,000 per year through state and local property, income, sales, and payroll taxes.

The Project construction period could commence as early as December 2011 and conclude as late as December 2012, depending on the turbine and construction company selected. Initial site preparation, including access roads and turbine foundations, would commence in December 2011 with the turbine erection and balance of plant construction occurring during the summer and fall of 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 20 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 laborers would use lodging facilities in Cimarron, Dodge City, or Garden City. 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. These accommodations would likely be found in close proximity to the Project Area, such as the City of Cimarron, Dodge City, or Garden City. Unoccupied residences would likely be rented or purchased, providing additional revenue to these areas. Additionally, permanent workers may construct new residences in these towns bringing in additional work for local contractors and additional income to the tax base. Easement Agreement payments would provide landowners with supplemental income.

As discussed in Chapter 4.1, it is anticipated that 44 acres of prime farmland and 0.1 acre of farmland of statewide importance would be permanently disturbed from operation of the Project according to the proposed layout. The impact is considered negligible when compared to the existing agricultural production of the rest of the Project Area and Gray County overall. During construction and operation, CPV would reimburse landowners for damaged crops as specified in the Easement Agreement between CPV and the landowner.

The Project would permanently impact approximately 56 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 purposes around turbine locations. Landowners would be consulted, as needed, to minimize impacts further on prime farmland and other productive farmland areas during final micrositing.

Cumulative Effects

The revenue generated from expenditures and Easement Agreement and tax payments from this Project and others would be realized.

4.10.2. No Action Alternative

Under the No Action Alternative, no aspect of the Project would be built, and Easement Agreement 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 Gray County from Easement Agreement and tax payments would not occur.

4.11. Transportation

4.11.1. Proposed Action

4.11.1.1. Roads

The Project would include approximately 18 mi of new gravel access roads and 5 mi of improved existing roads. During construction, both the new and existing roads would average approximately 16 ft in width, with 8 ft compacted shoulders for cranes to walk upon, and 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 to approximately 16 ft wide during operation and shoulders reseeded. Landowners would continue to be consulted in order to locate access roads in a manner that preserves existing land uses to the greatest extent practicable.

Construction and improvement of roads would be conducted in conformance with applicable state laws and the Road Use and Maintenance Agreement with Gray County, dated December 4, 2009. All required state and local permits to ensure that road construction or widening is in conformance with applicable regulations and minimizes adverse impacts would be obtained. Turbine setbacks equal to 1.1 times the turbine blade tip height from the center of the county, state, and federal road right-of-ways would be implemented to minimize potential for impacts.

4.11.1.2. Traffic

Traffic impacts from the Project would be greatest during Project construction. Impacts may be most noticeable on the local county roads within the Project Area, which have particularly low existing traffic use. CPV estimates a total of approximately 18,000 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 50 maximum daily round trips at the peak of the Project construction effort. However, based on the existing traffic use, the rural nature of the area, and the short-term duration, 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 Use and Maintenance Agreement with Gray County.

Trucks would likely access the Project Area from U.S. Route 50/400 or State Highway 23, depending on the truck source and delivery destination. Delivery of large components on trucks to the Project during construction is estimated to require approximately 960 loads for wind

turbine components, approximately 320 loads for contractor equipment (accounting for equipment hauled in and out after use), and approximately 6,960 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 municipality, as necessary.

A short segment of overhead transmission line is proposed for the Project; however this segment would not cross state or federal highways. Crossing of county roads would be conducted in accordance with the Road Use and Maintenance Agreement with Gray County and applicable local permits. No work within KDOT rights-of-way is proposed.

The KDOT has informed TVA that U.S. Route 50/400 is scheduled for reconstruction which may temporarily prevent movement of over-dimensional loads on this thoroughfare. The Developer would work with the KDOT 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.

4.11.1.3. Air Traffic

Aviation Systems, Inc. conducted two desktop evaluations of the Project from the perspectives of air traffic and aviation (Aviation Systems 2007; Aviation Systems 2011; Appendix S). The results of the July 2007 and February 2011 evaluations were used to develop a Project Area at a sufficient distance from local airports such that no impacts on air traffic are expected (Figure 2-3) from the turbines. In accordance with FAR Part 77, a Notice of Proposed Construction or Alteration to the FAA has been submitted for each turbine location. The FAA issued Determinations of No Hazard for all turbines proposed here on August 4, 2011 (Appendix T).

4.11.1.4. Cumulative Effects

Construction of the Project may coincide with the reasonably foreseeable wind energy facility located adjacent to the Project, the 132 MW Duke Energy Cimarron II Windpower Project. Both projects are expected to be in service by December 2012. The 132 MW Cimarron II Windpower Project would likely have a similar or shorter construction duration as the Project and would result in comparable impacts. Because traffic-related impacts from both projects would be of short duration and traffic related activities would adhere to applicable local and state permits, cumulative impacts from both projects during construction are also anticipated to be minor. Similarly, road infrastructure related impacts and benefits (i.e., road improvements) are also expected to be minor and comparable because all wind energy projects must obtain a road agreement from Gray County. Cumulative effects related to air traffic are not anticipated because both wind energy projects have obtained Determinations of No Hazard from the FAA for all turbines.

Given the distance between the Project and the other proposed facilities within Gray County and surrounding counties, cumulative impacts with the other projects are not anticipated regardless of construction schedules.

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 the 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 would coordinate with service providers so as to avoid interference with their facilities. Negative impacts on these buried telecommunications cables would therefore be avoided.

Impacts to the two private microwave beam paths that cross the northeast corner of the Project Area have been avoided by siting turbines outside of the WCFZ of each path (Figure 2-3). Impacts to AM/FM radio broadcasts and LMR communications are not likely given the distance of the wind turbines to the antennas and repeaters.

Cumulative Effects
The potential for effects to communications is a localized phenomenon and is assessed for wind projects on an individual basis. This characteristic, the typical siting consideration given to interference with microwave beam baths (when appropriate), and the limited AM/FM radio stations and LMR repeaters in the vicinity of the Project indicate a low potential for effects to communication resources, either individually or collectively. 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

4.13.1.1. 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 1999). EMFs would be associated with Project components, including turbines, collection lines, and the Project substation. Turbines would be no closer than 1,000 ft to occupied residences on land under Easement Agreement with CPV and 2,000 ft to occupied residences on private land, and

the burial of the collection lines would be approximately 4 ft below ground, both of which would minimize exposure to EMFs beyond background levels. Fencing and warning signs would be placed around the Project substation.

4.13.1.2. 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.

The Phase I ESA, completed in October 2011 in conformance with the ASTM standard, has been used to minimize risk associated with existing RECs that may pose a threat to human health and safety. Any petroleum waste generated would be handled and disposed of in accordance with local, state, and federal regulations. Chemicals for Project activities would be stored in covered containers in a designated area. Pesticides or herbicides use would 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) would be covered as required in association with the NPDES permit application and SWPPP.

4.13.1.3. Security

CPV would 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 (1,000 ft on land under Easement Agreement with CPV; 2,000 ft not on eased land) and the centers of road right-of-way (1.1 times turbine tip height).

  These setback distances are considered appropriate based on Developer experience and examples set by other wind projects in Kansas. These distances would 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, would be contained within the solid steel enclosed tubular towers on which the turbines are mounted. Access to the tower would be restricted to a single solid steel door to be locked when not in use. The Project substation would have applicable warning signs and would 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.

4.13.1.4. 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 most of the 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 would 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.

4.14.1.1. 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 would 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 small number of full-time employees at the Project is expected 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.

4.14.1.2. 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 would comply with applicable Sunflower and SPP regulations and any requirements of their Interconnection Agreement, which specifically address electrical service. CPV would 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.

4.14.1.3. 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 1,000 ft of occupied residences on land under Easement Agreement and 2,000 ft of occupied residences not on easement land. 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 would be conducted under the requirements of the NPDES permit and SWPPP. It is likely that the Project would require water 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. Additionally, the KDA noted in its scoping comments that irrigated land within the Project Area may have water rights associated with the land. Water right owners are responsible for reporting nonuse of water if cropland is temporarily or permanently taken out of production for the construction and operation of the Project. As stated in Chapter 4.5, the Project would temporarily disturb 249 acres of land and permanently disturb 56 acres of land, which represent a minute portion of the Project Area used for crop production.

4.14.1.4. Cumulative Effects

Based on the small incremental effects of the Project and the comparable impacts of the proposed adjacent wind energy facility 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 Gray 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 EO 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.

CHAPTER 5

5.0 SUMMARY OF COMMITMENTS AND MITIGATION MEASURES

Chapter 5 of the EA stipulates commitments, mitigation and conservation measures that will be applied in the event that TVA chooses the Action Alternative. As appropriate, these measures would be implemented by TVA and/or CPV (the Developer) under the contingencies identified below.

As discussed in Chapter 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

Through the design and engineering process, the Developer has worked to reduce the temporary and permanent Project footprint (Chapter 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 would 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 floodplains, other than as incorporated in Project design and best management practices described in Chapter 2.1.2.

- CPV would obtain Stream Obstruction Permits from the KDA for the applicable drainage crossings approximately three months in advance of construction.

- Wetland areas disturbed by construction would be restored to grade and revegetated with native seed or as specified by the local NRCS staff. Areas under crop would be restored and revegetated as per the landowner's request. Because anticipated wetland impacts are so small because of project design and the best management practices identified in Chapter 2.1.2, mitigation is not planned specifically to offset minor effects on wetlands.

- CPV would adhere to conditions outlined in its NPDES permit for stormwater runoff, which includes development of a SWPPP and implementation of BMPs to avoid, minimize and mitigate for potential impacts to surface waters affected by the Project.

- CPV would employ an Environmental Inspector to document compliance with the SWPPP and effectiveness of BMPs during construction of its Project.

5.2.2. Groundwater

- All necessary water appropriation and use permits would be obtained in consultation with the KDA prior to construction.

- CPV would consult with the KDHE prior to construction and operations to determine the need for the Project to obtain a State Water Pollution Control Permit.

- 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.

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 and execute 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; and

- Work closely with the USFWS and KDWPT to continue to minimize impacts on vegetation within the Project Area during micrositing.

As also described in Chapter 2.1.2, CPV would 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 grasslands through Project design (Chapter 2.1.2) and the measures indicated above for vegetation;

- Protect existing trees and shrubs where practicable. If impacts are unavoidable, CPV would 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, KDWPT, and NRCS;

- Control noxious weeds, per the management plan, 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 the ABPP as developed in conjunction with TVA and the USFWS. The ABPP includes post-construction monitoring strategies, personnel training, the development of a Wildlife Response and Reporting System, and an adaptive management strategy; and

- Establish a vehicular speed limit on Project roads.

In the consultation between TVA and 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 grasslands. 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 to the measures discussed above, the Developer would perform all commitments developed under the Section 7 consultation between TVA and the USFWS, as identified in the Biological Assessment (Appendix Q). Beyond the avoidance measures identified in the discussions associated with siting the Project (Chapter 2.1.2), as well as those for rare, threatened, and endangered species (Chapter 4.3.1) and wetlands (Chapter 4.2.1), additional measures agreed to in consultation discussions include a Funding Agreement dated October 17, 2011 between CPV and Ducks Unlimited, Inc. in support of 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 has consulted with the SHPO regarding results of archaeological and architectural investigations. Avoidance and mitigation measures are identified herein and the pertinent correspondence concluding the consultation between TVA, SHPO, and interested federally recognized Native American Tribes as proscribed as part of the Section 106 consultation process is included in Appendix R.

CPV has taken steps to reduce impacts on potentially significant cultural resources in the archaeological and architectural APE through the following efforts:

- Project designs would minimize construction around playas and stream drainages to the extent practicable where prehistoric and historic sites may be located;
- Identified historic properties would be avoided to reduce impacts on potential archaeological sites, architectural resources, and possible unmarked graves;
- Project setbacks from extant roads and occupied buildings potentially have the added benefit of reducing impacts on some historic period archaeological sites and architectural resources, if present; and

- A draft 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.

- Because visual effects to the one NRHP-eligible architectural resource (TTCW8) cannot be avoided through Project design modification or screening, TVA in consultation with the Developer and SHPO developed an alternative mitigation strategy to address the effect. Per the stipulations in the MOA (Appendix R), CPV will implement the treatment plan mitigation measures agreed upon through consultation with TVA and SHPO. The stipulations in the MOA include: entering all 21 architectural resources in the Kansas Historic Resources Inventory online database (completed October 20, 2011); providing a donation to the Kansas Historic Preservation Fund for historic preservation-eligible activities in Gray County; and providing National Register documentation to SHPO on TTCW8.

5.5. Land Use

- To reduce potential impacts on occupied residences, turbines would be installed a minimum of 1,000 ft from occupied residences on land under Easement Agreement with CPV and 2,000 ft from occupied residences not on eased land.

- CPV would work 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.

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

5.6. Recreational Resources

There are no recreational resources within the Project Area, as a result, there would be no physical disturbance to recreation resources that would necessitate mitigation.

5.7. Visual Resources

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

5.8. Noise

CPV would minimize sound impacts from the Project through setback distances employed for wind turbines. The setback prescribed by CPV for landowners under agreement would be a minimum of 1,000 ft.

5.9. Air Quality and Climate Change

As appropriate, localized effects to air quality caused by creation of *de minimis* 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 would be consulted, as needed, to minimize impacts further on prime farmland and other productive farmland areas during final micrositing.

5.11. Transportation

- Landowners would 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 would be obtained.

- A Road Use and Maintenance Agreement with Gray 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 would be implemented to minimize impacts.

- The Developer would coordinate with Gray County regarding county road use during construction, as outlined to in the Road Use and Maintenance Agreement and obtain all necessary oversized and haul permits from the KDOT 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 would coordinate with service providers so as to avoid interference with their facilities.

- Because impacts on telecommunications infrastructure are expected to be minimal, and any potential effects to the two microwave beams crossing the Project Area have been preemptively avoided during siting of Project facilities, mitigation measures are not proposed.

5.13. Public Safety

The following measures would be implemented to ensure public safety.

- CPV would set back wind turbines at least 1,000 ft from occupied residences on land under Easement Agreement with CPV and at least 2,000 ft from occupied residences not on eased land, 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, has been used to minimize risk associated with existing RECs that may pose a threat to human health and safety.

- Any petroleum waste generated would be handled and disposed of in accordance with local, state, and federal regulations. Chemicals for Project activities would be stored in covered containers in a designated area. Pesticides or herbicides use would 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) would be covered as required in association with the NPDES permit application and SWPPP.

CPV would 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 (1,000 ft from occupied residences on land under Easement Agreement with CPV and 2,000 ft from occupied residences not on eased land) and the centers of road right-of-way (1.1 times turbine tip height). These setback distances are considered appropriate based on Developer experience and examples set by other wind projects in Kansas. These distances would also serve to mitigate EMF levels, 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, would be contained within the solid steel enclosed tubular towers on which the turbines are mounted. Access to the tower would be restricted to a single solid steel door to be locked when not in use. The Project substation would have applicable warning signs and would be fenced and locked.

5.14. Public Services

The following measures would be implemented to protect public services.

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

- CPV would 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 would comply with applicable system operator regulations and any requirements of their Interconnection Agreement, which specifically address electrical service. CPV would 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 would be conducted under the requirements of the NPDES 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.

CHAPTER 6

6.0 LIST OF PREPARERS

Table 6-1 summarizes the expertise and contribution made to the final 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., Zoology (Ecology); B.S., Zoology (Aquatic Ecology) 36 years environmental policy, analyses, and assessment
RICHARD TOENNISSON Contract Senior NEPA Specialist TVA	NEPA Compliance and NEPA Project Management, Document Reviewer M.S., Forest Products/Industrial Engineering; B.S., Forestry 20 years in Forest Management and Products Engineering; 17 years in Environmental Science and NEPA Compliance
JOHN BAXTER Specialist Aquatic Endangered Species TVA	Reviewer Ecology and Listed Federal Species M.S. and B.S., Zoology 22 years in Protected Aquatic Species Monitoring, Habitat Assessment, and Recovery; 14 years in Environmental Review
SARAH A. BLANKENSHIP Contract Archaeologist TVA	Reviewer Cultural Resources Ph.D. (in progress), Anthropology (Archaeology); M.A. and B.A. Anthropology (Archaeology) 12 years in Archaeology at the Academic Level and in Cultural Resource Management
PATRICIA B. COX Botanist, Specialist TVA	Reviewer Botany and Listed Federal Species Ph.D., Botany (Plant Taxonomy and Anatomy); M.S. and B.S., Biology 31 years in Plant Taxonomy at the Academic Level; eight years in Rare Species Monitoring, Environmental Assessment, and NEPA Compliance
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; nine years in tribal relations
HOLLY LE GRAND Zoologist TVA	Reviewer Terrestrial Ecology and Habitat M.S., Wildlife; B.S., Biology Nine years in Biological Surveys, Natural Resource Management,
MICHAELYN HARLE Archaeologist TVA	Reviewer Cultural Resources Ph.D., Anthropology 12 years in Archaeology and Cultural Resource Management
P. ALAN MAYS Environmental Scientist TVA	Reviewer Prime Farmland and Soil B.S., Plant and Soil Science 33 Years in Soil-Plant_Atmospheric Studies
KIM PILARSKI Senior Wetlands Biologist TVA	Reviewer Wetlands Resources M.S., Geography, Minor Ecology 17 years of experience in wetlands assessment and delineation
RICHARD YARNELL Archaeologist TVA	Conducted SHPO Coordination and Reviewer Cultural Resources B.S., Environmental Health 40 years, Cultural Resource Management

CPV and Tetra Tech

Name and Title	Contribution and Expertise
MICHAEL RESCA Director Competitive Power Ventures, Inc.	Michael Resca has over six years of experience in energy project development. He has led the development of the Project for CPV since 2009, being responsible for all aspects of the Project leading up to construction.
JOHN MURPHY Senior Vice President Engineering & 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 20 years of experience in energy project development. He 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 Cimarron Wind Energy Project – Phase 1. 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 ten 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.
KARL KOSCIUCH, PH.D. Senior Ecologist Tetra Tech EC, Inc.	Dr. Kosciuch has over 15 years of experience in wildlife biology and four years of experience in wind-wildlife studies. He is the senior ecologist supporting the Project and has served as the task lead and senior reviewer of the 2010 Fall Avian Report (Appendix G), 2010 Spring Avian Report (Appendix F), 2010 Turbine Model Comparison for the Spring and Fall 2010 Avian Surveys (Appendix P), Native Grassland Survey (Appendix E), Bat Likelihood of Occurrence Report (Appendix H), Whooping Crane Likelihood of Occurrence Report (Appendix I), and wildlife chapters of this EA.
SYDNE MARSHALL, PH.D. Professional Archaeologist Tetra Tech EC, Inc.	Dr. Sydne Marshall has over 30 years of 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 Phase I and Phase II cultural reports, Historic Architectural Reconnaissance 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 15 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 C) and water 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 modeling 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 and performed wind flow modeling and mapping for the Project.
COMSEARCH Spectrum Resources	COMSEARCH has over 30 years of 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 O).
ENVIRONMENTAL DATA RESOURCES INC. Environmental Risk Review	Environmental Data Resources Inc. has over 20 years of experience in providing developers with environmental risk information services. They provided an environmental risk report for the Project. The report was referenced in Chapter 3.13.2 of this EA.
AVIATION SYSTEMS, INC. Aviation Consultants	Aviation Systems, Inc. has approximately 40 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 S).
SCOTT GLAUBITZ, P.E., P.L.S. President B.S.E. Consultants, Inc.	Scott Glaubitz has over 30 years of 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.

CHAPTER 7

7.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS WHO WERE CONSULTED

Federal Agencies

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Gray County Commissioners
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CHAPTER 8

8.0 LITERATURE CITED

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Appendices

Appendix A – Scoping Documentation

Appendix B – Public Notice and Comments on Draft EA

Appendix C – Delineation of Wetlands and Waters of the United States

Appendix D – Supplemental Delineation of Wetlands and Waters of the United States

Appendix E – Native Grassland Survey

Appendix F – 2010 Spring Avian Survey

Appendix G – 2010 Fall Avian Survey

Appendix H – Bat Likelihood of Occurrence Report

Appendix I – Whooping Crane Likelihood of Occurrence Report

Appendix J – Phase I Reconnaissance Survey

Appendix K – Phase II Intensive Archaeological Survey

Appendix L – Supplemental Phase II Intensive Archaeological Survey

Appendix M – Historic Architecture Reconnaissance Survey

Appendix N – Supplemental Historic Architecture Reconnaissance Survey

Appendix O – Comsearch Telecommunications Studies

Appendix P – Turbine Model Comparison for the 2010 Spring and Fall Avian Surveys

Appendix Q – Section 7 Consultation Documentation

Appendix R – Section 106 Consultation Documentation

Appendix S – Aviation Systems, Inc. Feasibility Evaluation

Appendix T – Determination of No Hazard