DOE/EA-1903

DRAFT
ENVIRONMENTAL ASSESSMENT

KANSAS STATE UNIVERSITY'S ZOND WIND ENERGY PROJECT

MANHATTAN, KANSAS

U.S. Department of Energy
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ACRONYMS AND ABBREVIATIONS

BMPs	best management practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DASR	digital airport surveillance radar
dB	decibel
dBA	decibel A-weighted
DOE	Department of Energy
EA	environmental assessment
EMF	electromagnetic field
FAA	Federal Aviation Administration
KDOT	Kansas Department of Transportation
KSU	Kansas State University
kW	kilowatt
NEPA	National Environmental Policy Act
NEXRAD	Next Generation Weather Radar
NHPA	National Historic Preservation Act
SHPO	State Historic Preservation Office(r)
US-24	U.S. Highway 24
U.S.	United States
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
WWPTO	Wind and Water Power Technologies Office

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1. INTRODUCTION

1.1 National Environmental Policy Act

The *National Environmental Policy Act* [42 United States Code (U.S.C.) 4321 *et seq*.; NEPA], Council on Environmental Quality (CEQ) Regulations for Implementing NEPA [40 *Code of Regulation* (CFR) Parts 1500 to 1508], and United States (U.S.) Department of Energy (DOE) implementing procedures for NEPA (10 CFR Part 1021) require that DOE consider the potential environmental impacts of a proposed federal action before committing to that action. The proposal to provide federal financial assistance is considered a federal action subject to the procedural requirements of NEPA and the NEPA implementing regulations of CEQ and DOE. To comply with these requirements, DOE has determined that an environmental assessment (EA) should be prepared to evaluate the potential environmental impacts that could result from the Proposed Action.

In compliance with these regulations, this EA:

- Examines potential environmental impacts of the Proposed Action and No-Action Alternative;
- Identifies unavoidable adverse environmental impacts of the Proposed Action;
- Describes the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- Characterizes any irreversible and irretrievable commitments of resources should DOE decide to implement its Proposed Action.

DOE must meet the requirements of NEPA before making a final decision to proceed with a proposed federal action that could adversely impact human health or the environment.

1.2 Background

KSU offers educational opportunities and conducts research in sustainable and renewable energy resources. Sustainability concepts for wind energy are incorporated into the KSU Department of Electrical and Computer Engineering curriculum. This department implements the Wind Application Center to instruct and train students in wind power physics and engineering, and to plan, install, operate, and maintain wind generation equipment.

Westar Energy, the electrical utility provider in Kansas, donated a Zond Z-50 model wind turbine to KSU to use for education and research. KSU pursued funding from DOE through the Wind and Water Power Technologies Office (WWPTO), which falls under DOE's Office of Energy Efficiency and Renewable Energy, to refurbish, install, and operate the turbine. A part of the WWPTO's mission is to enable the expansion of domestic wind power to help meet the nation's energy needs and to promote economic vitality and environmental quality. The WWPTO works with universities to conduct research and development activities, and manages the public's investment in wind technologies to improve the performance and lower the cost of wind power (DOE 2012).

Congress provided funding in the Omnibus Appropriations Act of 2009 (Public Law 111-8) to DOE for energy efficiency and renewable energy projects, including funds directed to KSU. KSU is proposing to use a portion of those funds for its Zond Wind Energy Project.

In compliance with CEQ and DOE NEPA regulations, DOE prepared this EA to evaluate the potential environmental impacts of DOE's Proposed Action, providing funding to KSU for its proposed project. The EA also evaluates the No-Action Alternative under which DOE would not provide funding and, for purposes of this EA, assumes the proposed project would not proceed. The purpose of this EA is to inform DOE and the public of the potential environmental impacts of the proposed project and the alternatives. The provision of financial assistance for KSU's proposed project is conditional upon the completion of the NEPA process and a final decision by DOE.

1.3 Purpose and Need

1.3.1 DOE'S PURPOSE AND NEED

The DOE WWPTO supports the research, development, and deployment of wind technologies. The overall purpose for DOE action pursuant to the WWPTO and Congressional direction is to improve performance, lower the costs, and accelerate the deployment of wind power technologies by supporting research and education of wind power at the university level. This type of research is essential to making progress toward significant increases in wind energy. There is a specific need to advance wind power research and to develop skilled scientists and engineers who can develop the next generation of wind power technologies. Further, the overall need is to reduce U.S. dependence on imported oil, decrease energy consumption, and promote renewable energy.

1.3.2 KSU'S PURPOSE AND NEED

KSU's purpose and need for action is to use the Westar Energy donation of a wind turbine to enhance its educational and research opportunities in wind energy. Incorporating wind energy principles throughout the Department of Electrical and Computer Engineering curriculum would help bolster student enrollment and graduate engineers equipped to address the technical issues of the evolving renewable energy sector. The wind turbine could be used by student researchers to compare developing wind technologies, study the efficiency of renewable energy generators, and explore methods to integrate with the power grid. When not used for research and education, the turbine would generate electricity that would be relayed to the grid to reduce KSU's electricity consumption costs.

1.4 Public Involvement and Agency Consultation

1.4.1 SCOPING

Scoping is the process of determining the scope of environmental impacts to be analyzed a NEPA document. DOE notified federal, state, and local agencies, tribal government representatives, elected officials, organizations, businesses, and residents of KSU's proposed project. DOE mailed notices directing the recipients to the DOE Golden Field Office Public Reading Room website (http://www.eere.energy.gov/golden/NEPA_DEA.aspx) to read a scoping letter that described KSU's proposed Wind Energy Project and requested information on potential issues that should be evaluated in the EA. The scoping comment period was open from November 8 to December 7, 2012. Appendix A includes the notice of scoping, scoping letter with project location maps, and distribution list of recipients of the notice.

Table 1-1 summarizes the public and agency comments received in response to the scoping notice and the sections of the EA that address the comments. Appendix A includes copies of the comment letters and emails.

Table 1-1. Summary of Public and Agency Scoping Comments

Author	Comments	EA Section
U.S. Environmental Protection Agency	Consider alternate locations on and off KSU property which could meet the purpose and need for the project; assess impacts of the adjacent substation construction and operation with impacts of the project.	2.4 4.1 4.2
U.S. Fish and Wildlife Service	Use only the minimum obstruction lighting and marking required by the Federal Aviation Administration (FAA); minimize use of guy wires; minimize habitat loss and fragmentation; down-shield security lighting.	2.2.2 2.5 3.4.2 3.6.2.5
Riley County Planning and Development	Project location is zoned for agriculture; zoning approval for a special use will be required; contact Fort Riley for input.	2.5 3.3.2
Kansas Department of Wildlife, Parks, and Tourism	No impacts to state threatened or endangered species, wildlife habitat, or public recreational areas are anticipated; minimize removal of native vegetation and implement standard erosion control practices.	2.5 3.2.2 3.4.2
Fort Riley Environmental Division, Public Works	Wind turbine would be in line-of-sight of the Digital Airport Surveillance Radar; however, it is impossible to determine if the turbine would be detected by the radar; Fort Riley neither objects nor endorses the project.	3.6.2.5 3.6.2.7
Private Citizen	Inquired as to dimensions and number of turbines, noise, visual appearance, maintenance, cost, and return on investment.	2.2 3.7 3.9

1.4.2 AGENCY CONSULTATION

DOE is required by certain statutes and regulations to consult with federal and state agencies having specific expertise. Appendix B includes copies of the agency consultation letters.

U.S. Fish and Wildlife Service

Section 7 of the *Endangered Species Act* (16 U.S.C. 1531 *et seq.*) requires consultation with the U.S. Fish and Wildlife Service (USFWS) to insure that a federal action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Pursuant to obligations under Section 7, DOE sent a letter to the USFWS requesting information on listed species in the project area and stating the project location does not likely provide suitable habitat for these species. By letter, dated September 24, 2012, the USFWS concurred with DOE's determination that the project would not adversely affect any federally listed threatened or endangered species, and no further Section 7 consultation is needed.

Kansas Historical Society (State Historic Preservation Office)

Section 106 of the *National Historic Preservation Act* (NHPA) (16 U.S.C. 470 *et. seq.*, 36 CFR Part 800) requires consultation with the State Historic Preservation Officer (SHPO) to assess the effects of a federal action on historic properties. DOE sent a letter to the Kansas Historical Society (the SHPO) requesting concurrence with the determination that, with certain stipulations, the project would not affect historic properties. These stipulations include temporary fencing and erosion control measures around a possible prehistoric burial site, and development of a cultural awareness program for those who may have access to the wind turbine site. By letter dated November 7, 2012, the SHPO concurred with DOE's determination of no effect and has no objection to the project.

Pursuant to additional obligations with Section 106 and the *Native American Graves Protection and Repatriation Act* (25 U.S.C. 3001 *et seq.*), DOE sent a letter to four American Indian tribes that have

expressed interest in the area and requested their comments on potential effects to properties of traditional or cultural significance. None of the four tribes responded.

Federal Aviation Administration

The U.S. Department of Transportation air commerce and safety regulations (49 U.S.C. 44718, 14 CFR Part 77) require notice and evaluation of structures for the safe and efficient use of navigable airspace. KSU submitted notice to the FAA of the proposed wind turbine project. FAA completed an aeronautical evaluation and concluded that with white paint and synchronized red lights, the wind turbine would not be a hazard to air navigation.

Natural Resources Conservation Service

The *Farmland Protection Policy Act* (7 U.S.C. 4201 *et seq.*) requires DOE to ensure its actions would not unnecessarily convert farmland designated as prime, unique, or of statewide importance to nonagricultural uses. The Farmland Conversion Impact Rating form completed jointly by DOE and the Natural Resources Conservation Service (NRCS) indicates a low relative value of the soils as productive farmland.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 DOE's Proposed Action

The DOE Proposed Action is to authorize KSU to expend federal funds to refurbish, install and operate the KSU Zond Wind Energy Project, as described in the following section.

DOE has authorized KSU to use some of the federal funding for preliminary activities, including preparing this EA and conducting associated environmental studies, and for preliminary planning, design, and permitting. These activities are associated with the Proposed Action and do not significantly impact the environment nor represent an irreversible or irretrievable commitment by DOE prior to the completion of the NEPA process.

2.2 KSU's Proposed Project

KSU proposes to use federal funds for the Zond Wind Energy Project. The proposed project involves refurbishing the Zond Z-50 model wind turbine that was donated to KSU by Westar Energy, and installing it on KSU property to use for research and education, with energy production as an ancillary benefit.

The Zond Z-50 is a 750-kilowatt (kW) turbine with three blades. The tower is 164 feet (50 meters) tall and each blade is 82 feet (25 meters) long for a total turbine (blade) height of 246 feet (75 meters). For comparison, turbines on large-scale wind farms in Kansas are generally one to two megawatts, with towers (80 to 100 meters) and blades (40 to 45 meters) twice the size of this Zond turbine model.

Wind Turbine Similar to Zond Model

2.2.1 PROJECT LOCATION

The project site is on KSU property approximately 3 miles north of the College of Engineering building on the main campus in the City of Manhattan, Kansas (Figure 2-1). The site is located in the southeast quarter of Section 25, Township 9 North, Range 7 East of the 6th Principle Meridian in Riley County, which is outside the city limits of Manhattan. The Manhattan Regional Airport is located approximately 8 miles to the southwest.

The siting criteria defined and used by KSU to select the project location were land ownership, elevation to maximize wind potential, proximity to an available power source, site access, and environmental and manmade constraints. The preferred location that KSU selected for the project best met the siting criteria compared to other possible locations (Section 2.4). An existing access road and the nearby power source (Westar Energy Substation) would minimize construction costs and environmental disturbances, and known locations of prehistoric burial grounds would be avoided.

The project site is located on a bluff, north of Purcell Road and west of U.S. Highway 24 (US-24) (Figure 2-2). The segment of US-24 through Manhattan is called Tuttle Creek Boulevard. The approximate elevation of the site is 1215 feet. For comparison, the elevation of US-24 at Purcell Road is approximately 1070 feet, 145 feet lower than the project site. The site is native prairie grassland used as pasture and was disturbed recently for installation of transmission lines and towers.

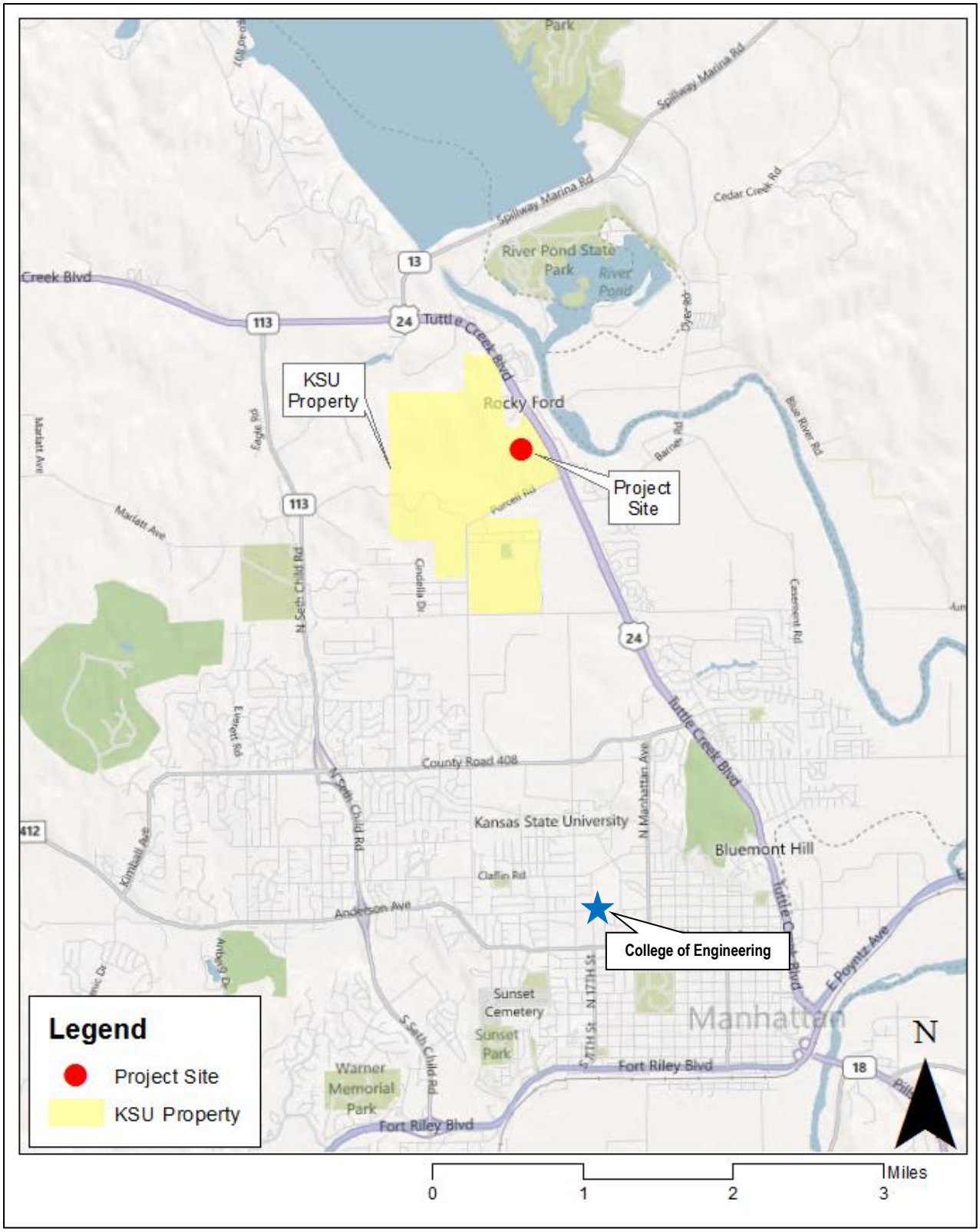


Figure 2-1. Project Vicinity

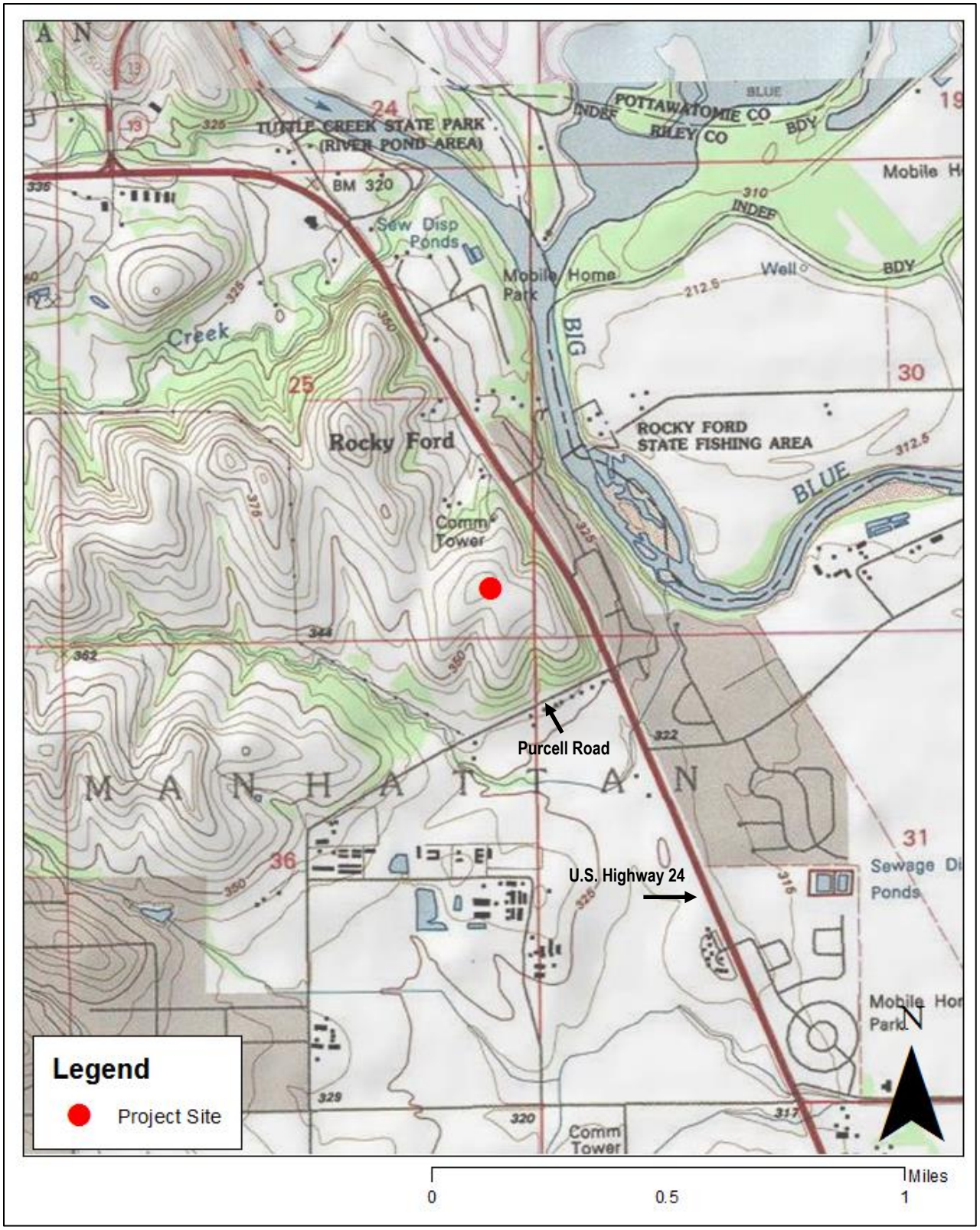


Figure 2-2. Project Site Location

2.2.2 CONSTRUCTION AND INSTALLATION

Construction and installation of the turbine would begin after detailed design is completed, applicable permits are obtained, and the nacelle components (generator, control panel, and gearbox) are refurbished.

The sequence for construction and installation would include improving the access road to the site; constructing the foundation; trenching and placing the electrical distribution line; transporting the tower and blades to the site; assembling and erecting the tower; installing the nacelle, rotor, blades, transformer, and communication equipment; testing the operation; and site cleanup and stabilization.

An existing gravel road off Purcell Road would be used to access the site (Figure 2-3). Westar Energy improved and used this road from late-2011 through 2012 during installation of the overhead transmission towers and lines from its new substation. The gravel road is 10 to 12 feet wide but would be widen up to 15 to 20 feet, as needed, and reinforced with additional gravel to safely accommodate the vehicles transporting the tower, blades, nacelle components, and cranes to the site.

The turbine foundation would be a reinforced concrete pad approximately 40 square feet by 8 feet deep. Soils information and subsurface physical conditions obtained through geotechnical testing of the site would be used to design the tower foundation. Geotechnical testing involves drilling a small diameter (generally 2 to 4 inches) boring to extract a soil core that is analyzed in a soil laboratory to determine the physical properties of the soil and rock around the site. A drill rig (generally mounted on a utility truck) is used to collect the soil core; a larger drill rig is used if bedrock may be encountered. One to four soil cores would probably be sufficient because of the size of the foundation. The depth of the boring is generally twice the depth of the foundation but would be less if bedrock is encountered. The drilling locations for soil cores would be in the same area proposed to be disturbed for the tower foundation, so there would be no additional ground disturbance for the geotechnical testing.

A temporary pad would be constructed for the crane used to erect the turbine, and a suitable area nearby would be mowed for construction staging and a lay down area for the tower sections and blades. Less than 2 acres would be needed for construction staging, lay down area, and a crane pad. A smaller truck crane would be used to assemble the larger crane and to help attach the blades to the rotor's hub on the ground prior to erection. A large crane would be used to assemble the tower, place the nacelle on top of the tower, and attach the blades to the nacelle hub. The tower would be anchored to the concrete foundation pad using anchor bolts. Guy wires or other external support systems are not needed.

A transformer would be installed near the base of the turbine and an electrical distribution line would connect the transformer to the electrical grid at the Westar Energy Substation. The distribution line would be installed underground for the entire distance between the substation and turbine, or it would be on aboveground poles for most of the distance and then placed underground as it approached the transformer. The length of the distribution line could be about 1,500 feet depending on where it originates from the substation (Figure 2-3). The corridor width needed for construction would be approximately 10 feet to trench in a 6-inch conduit for the distribution line or to install 40-foot tall poles; the temporary ground disturbance of up to one-third acre would be about the same for either distribution line option. The underground or above ground configuration of the transmission line would be determined during final design and coordination with Westar Energy. Warning signs indicating restricted access and high voltage areas would surround the turbine foundation.

Approximately 2 acres would be disturbed temporarily for construction and installation of the wind turbine, which includes construction staging, lay down area, crane pad, and the transmission line corridor. The permanent footprint of the project for the tower foundation and transformer would be approximately one-quarter acre.

Figure 2-3. Project Site Plan

The estimated time from final design, refurbishing the nacelle components, constructing and installing the turbine, transformer, and transmission line, to system start-up and operational testing is estimated at 12 months. Construction and installation activities would last two to four months, generally depending on environmental conditions (weather, wind). Tower, nacelle, and blade installations would not occur during high wind conditions, and the concrete foundation would not be poured during colder months.

2.2.3 OPERATION AND MAINTENANCE

The KSU Department of Electrical and Computer Engineering would operate the turbine according to procedures recommended by the turbine's manufacturer. The wind turbine would be monitored remotely using a wireless communications system of sensors, dataloggers, and computers. KSU estimates the turbine would operate between 50 and 70 percent of the time based on favorable wind conditions, scheduled and unscheduled maintenance, and tests or research that require the system to be down (KSU 2010). University students would conduct research projects, such as efficient turbine operations and integration with the electrical grid system.

When not being used for research and education, the turbine would generate electricity that would be relayed to the grid and Westar Energy would directly reduce KSU's electricity consumption costs by the amount generated. The estimated annual power production could be 1.46 million kW-hours based on the wind frequency distribution and the Zond's power curve (KSU 2010).

KSU would hire an experienced contractor to maintain the turbine and to work with students on routine maintenance tasks. A typical wind turbine requires routine service once or twice per year. Oil and filters need to be changed, operating components need to be inspected, and bolts need to be tightened. KSU would ensure that the contractor follows appropriate waste disposal and recycling regulations pertaining to used oil and filters. Most servicing would be performed up-tower without having to use a crane to remove the nacelle from the tower. The turbine foundation and trenched area would be inspected regularly for subsidence and erosion.

2.2.4 DECOMMISSIONING

KSU would retain title to the wind turbine and associated infrastructure and would be responsible for any decommissioning. The useful life of a refurbished turbine could be 10 years or more (Douglas-Miller 2011). When the Zond Wind Energy Project is terminated or the turbine reaches its useful life and is no longer useable or outdated for research and education, it is anticipated that KSU would remove and salvage the turbine, transformer, and other equipment. Salvageable items (including fluids) would be sold, reused, or recycled as appropriate, and unsalvageable material would be disposed of at authorized locations. The concrete foundation, underground distribution line, and access road could be safely secured and left in place or removed at KSU's discretion. Reclamation of disturbed ground would be based on site-specific requirements employed at the time the area is decommissioned and could include re-grading, adding topsoil, and replanting with native plant species.

2.3 No-Action Alternative

DOE would not authorize the expenditure of federal funds for the KSU Zond Wind Energy Project under the No-Action Alternative. For purposes of this EA, DOE assumes that KSU would not proceed with their project without this funding and the Zond turbine would be returned to Westar Energy. This assumption allows a comparison of potential impacts from implementing the project as proposed by KSU with the impacts of not proceeding with the project. There would be no project related impacts if no action is taken.

2.4 Alternate Sites Considered but Eliminated

KSU evaluated two other sites near the preferred location and a site located southeast of Manhattan on a smaller parcel of KSU property. These three alternate sites did not meet the siting criteria (listed in Section 2.2.1) as optimally as did the preferred site, and therefore, were eliminated from detailed analysis.

Two alternate sites near the preferred location were constrained by existing and planned infrastructure and known locations of prehistoric burial grounds. The infrastructure included the Westar Energy Substation, two 330-kilovolt transmission lines, and the communication path of the Cox Communications tower that is located to the north. Although KSU would tap power for the wind turbine from the Westar Energy Substation, the substation is independent of the Zond Wind Energy Project. The substation and another transmission line were part of Westar Energy's long-range strategic plan and were sited and planned for construction before the site selection process for KSU's wind energy project. The elevation of both alternate sites would maximize wind potential, but the costs and environmental impacts related to the construction of access roads and the electrical distribution lines were much greater than the preferred site.

The third alternate site is located at a greater distance from the KSU main campus and the College of Engineering building. Although it is near an adequate power source, returning power generated by the Zond to the grid would not be as beneficial as at the preferred site because of the distance to and size of the transmission lines. This alternate site is much closer to rural houses and is in a more open area that could have greater impacts to the surrounding area from noise, visual intrusion, and shadow flicker.

Property not owned by KSU was not considered because of additional cost to acquire ownership or right-of-way for access to install and operate the turbine. KSU would be negligent in its fiduciary responsibilities if it expended limited funds to acquire private property when acceptable sites for the project are located on KSU property. These funds would be better used for wind energy education and research. Because no private property sites were considered, the merits of any environmental issues were not addressed.

2.5 Applicant Committed Resource Protection Measures

As part of the proposed project, KSU has committed to the following measures and procedures to minimize or avoid impacts if the Proposed Action is carried forward:

2.5.1 GENERAL

- KSU will use standard best management practices (BMPs) during construction and operation to minimize or avoid potential impacts to the surrounding environment, and to safeguard the health and safety of faculty, staff, students, construction workers, and the public. This includes the proper disposal or recycling of solid wastes, used oils, and other hazardous or non-hazardous materials.

- KSU will obtain required local permits and incorporate specific measures into construction bid documents for contractors to follow. Implementation of these measures by KSU will also ensure that all federal, state, and local laws established for the protection of the environment are followed. These local requirements include a Notice of Intent for a Construction Stormwater General Permit from the Kansas Department of Health and Environment, and a site-specific Stormwater Pollution Prevention Plan that lists BMPs to control stormwater runoff from the project site.

2.5.2 LAND USE

- KSU will obtain a *Section 22-Special Uses* permit from the Riley County Planning and Development Department to install the wind turbine in an agricultural district zoning designation.

- KSU will regularly inspect the turbine foundation and utility trenches for subsidence and erosion.

2.5.3 BIOLOGICAL RESOURCES

- KSU will reestablish vegetation on bare ground (native prairie grass seed and mulch), overseed compacted areas, and monitor and eradicate non-native noxious weeds after construction.

- KSU will conduct a visual survey of the project site for nesting activity if construction is scheduled to occur during bird breeding season (generally April through mid-July), and avoid active nests (containing eggs or young) until they are no longer active or the young birds have fledged. KSU will follow guidance from the Kansas Department of Wildlife on appropriate avoidance measures and distances to keep away from active nests.

- KSU will design and install security lighting to shield downward to avoid attraction by nocturnal species.

2.5.4 CULTURAL RESOURCES

- KSU will maintain the temporary fence installed in 2012 around a possible cultural burial feature identified near the project site to ensure the feature is avoided during construction (see section 3.5.2).

- KSU will cease all activities if cultural remains such as bones or artifacts are encountered during construction, and will coordinate with the Kansas Historical Society (the SHPO) to determine appropriate measures to identify and treat (mitigate) the resources encountered before allowing construction to continue. If human remains are encountered, KSU will notify DOE and the SHPO, who will notify tribal representatives in accordance with Kansas statutes.

- KSU will develop and implement a cultural awareness program in conjunction with the risk management and safety plan for the wind turbine project. The program will inform faculty, students, and construction contractors of the historic importance of maintaining the integrity of the burial feature and of the legal requirements to avoid disturbing culturally significant historic burial sites (see section 3.5.2).

2.5.5 HEALTH AND SAFETY

- KSU will maintain the lock and no-trespassing signs on the gate and fence surrounding the project site to deter unauthorized access for safety and security reasons.

- KSU will prepare and implement a risk management and safety plan for the Zond Wind Energy Project to ensure that established University policies and procedures are followed for a safe work environment for faculty and students conducting research with the wind turbine.

- KSU will require all hired construction and maintenance contractors to have health and safety plans addressing the hazards specific to the project site.

- KSU will mark (paint and install lighting) the wind turbine according to the requirements of the FAA. Red flashing (strobe) lights will be used instead of solid or pulsating (beacon) lights to minimize the attraction of night-migrating birds.

- KSU will install warning signs around the turbine foundation to indicate restricted access areas and high voltage areas.

- KSU will notify the Fort Riley airfield manager when the wind turbine is scheduled to be operational to minimize air safety hazards.

2.5.6 TRANSPORTATION

- KSU will require that contractors transporting the wind turbine components and cranes to the project site avoid peak travel times through Manhattan or as directed by local agencies to minimize delays of traffic on US-24 (Tuttle Creek Boulevard) and McCall Road.

- KSU will require the contractors to repair any damage to gravel roads caused by transporting overweight loads. The repair (blading) will be as directed by the agency responsible for the road.

2.5.7 VISUAL RESOURCES

- KSU will address any complaints from residents in the shadow flicker zone and will pay reasonable costs for shading devices such as window awnings, blinds, or vegetation.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This chapter describes the existing environment in the proposed project area that would potentially be affected if the Proposed Action is implemented. The existing environmental conditions serve as a baseline from which to identify and evaluate potential impacts attributed to the Proposed Action and No-Action Alternative. The potential impacts of DOE's Proposed Action in support of the KSU Zond Wind Energy Project are evaluated by resource and compared to the environmental consequences of the No-Action Alternative.

Impacts are defined in general terms and are qualified as direct or indirect, adverse or beneficial, and as short-term or long-term. Construction-related impacts are generally addressed by BMPs or permits required by federal, state, or local regulations to minimize or control the adverse effects of construction. Construction-related impacts are generally temporary, short-term, and cease after construction is complete, whereas operational impacts are generally permanent, long-term, and begin or continue after construction is complete.

3.1 Environmental Consequences of the No-Action Alternative

Under the No-Action Alternative, DOE would not authorize the use of federal funds to complete the construction and installation of the Zond wind turbine. For purposes of this EA in evaluating and comparing impacts, DOE assumes KSU would not proceed with the project without federal financial assistance. There would be no environmental consequences of not taking any action. The baseline conditions (affected environment) in the project area would remain relatively unchanged, and the potential impacts to the resources, as analyzed in the following sections of this EA, would not occur.

3.2 Environmental Resources Evaluated and Dismissed from Further Analysis

The scope of the environmental analysis is based on the environmental resources and issues potentially affected by the Proposed Action and the No-Action Alternative. Consistent with NEPA implementing regulations and guidance, DOE focuses the analysis in an EA on resources with potential for significant environmental impact. All resource areas and issues were initially considered, and through scoping with the public, agencies, and KSU, some were eliminated from detailed evaluation because they were not relevant, not in the project area, or not affected by the project.

3.2.1 AIR QUALITY

Air quality in the project area is designated as "attainment" for all criteria pollutants (40 CFR 81.317, *Attainment Status Designation, Kansas*). Because of the attainment designation, DOE does not need to determine if its federal action conforms to local air quality goals. However, a single operating wind turbine is not a major source of air pollutants. Small amounts of vehicle exhaust and dust (particulate matter) generated during construction and decommissioning would be temporary and would not change the attainment designation of the area.

The amount of wind-generated electricity by KSU's project that would reduce fossil-fuel combustion, and thus greenhouse gas emissions, elsewhere within Westar Energy's system is expected to be very small and possibly not measurable.

3.2.2 WATER RESOURCES

The project site is more than 150 feet above the valley floor. The turbine foundation would be 6 to 8 feet belowground, so excavation could be as deep as 10 feet. Groundwater is not expected to be encountered on the bluff top at this depth.

There are no surface waters, wetlands, drainages, or floodplains on or near the project site. Construction activities (including clearing) that disturb more than 1 acre are subject to provisions of the Construction Stormwater General Permit authorized by the Kansas Department of Health and Environment to protect water quality. Stormwater runoff from the project site would be controlled by implementing BMPs listed in a site-specific Stormwater Pollution Prevention Plan prepared for the project.

3.2.3 GEOLOGY AND SOILS

Results from geotechnical testing of the site would guide the turbine foundation design and address any geological hazards and soil conditions. The soil association on the project site is not classified as prime farmland. The project would permanently change about one-quarter acre of ground surface and temporarily disturb approximately 2 acres, with much of the temporary disturbance from mowing and compaction to clear the area. Because of the small amount of permanent and temporary soil disturbance and compliance with the Construction Stormwater General Permit conditions, soils would not be impacted.

3.2.4 INFRASTRUCTURE (UTILITIES AND ENERGY)

Interference from wind turbines can cause the obstruction, reflection, or refraction of microwave signals. Cox Communications maintains a microwave tower erected on KSU property approximately 850 feet north of the site proposed for the wind turbine. KSU coordinated closely with Cox Communications to ensure the turbine site would avoid the beam paths from the tower and not affect microwave signals. Cox Communications confirmed the preferred site for the wind turbine was acceptable (Downing 2011).

Water and sewer utilities would not be needed at the project site. Any temporary facilities or services provided during construction would be the responsibility of the construction contractors, and would be maintained and removed in accordance with any local requirements or as directed by KSU.

Electricity that would be relayed to the grid would directly reduce KSU's electricity consumption costs by approximately one percent (Douglas-Miller 2012), which is minimal but beneficial.

3.2.5 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Costs for construction and installation of the wind turbine, transformer, and distribution line would be approximately $500,000 and would be completed by contactors (KSU 2010). This amount of construction expenditure using existing contractors would not likely create any new jobs or measurably contribute to the local economy. There would be no long-term employment opportunities because KSU faculty and students would oversee operations of the wind turbine.

The concept of environmental justice is to review federal actions for disproportionately high and adverse effects on the health or environment of minority and low-income populations. The minority population of Riley County and the census tract covering a 1 mile radius around the project site is between 17 percent and 20 percent (BLS 2012). The higher minority percentage in the census tract is not meaningfully greater than Riley County. The percentage of families whose income is below the poverty level is 11 percent in the County and is less in the census tract at 8 percent (BLS 2012). Because there is no meaningful percent

difference between Riley County and the census tract, no environmental justice population based on minority or low-income status is present in the project area.

3.2.6 INTENTIONAL DESTRUCTIVE ACTS

Intentional destructive acts are acts of sabotage or terrorism. Installation and operation of this wind energy project would not include transportation, storage, or use of radioactive, explosive, or toxic materials and thus highly unlikely to be viewed as a potential target by saboteurs or terrorists. The project is not located in the vicinity of a major inland port, container terminal, or nuclear power plant, and although national defense infrastructure (Fort Riley) is nearby, the project is not considered a target of opportunity for intentional destructive acts.

3.3 Land Use

Land use is described by land activities, ownership, and the governing entities' management plans. Local zoning defines land use types and regulates development patterns.

3.3.1 AFFECTED ENVIRONMENT

The land proposed for the wind turbine site is part of a larger parcel owned by KSU located approximately 3 miles north of the main campus. The land is currently used by the KSU Department of Animal Sciences and Industry during the summer for pasture, an agricultural use. There are no proposed uses of this land other than the current agricultural use and for the wind turbine. Other land uses near the project site on the same bluff and on KSU property include the Cox Communications tower and the Westar Energy Substation with overhead transmission lines.

The existing and future land use for the project site is identified by the Riley County Comprehensive Plan as Public-KSU (Riley County 2009b). The zoning designation for the project site and the KSU property north of Purcell Road is AG-Agricultural District, and the property south of Purcell Road is U-University (Riley County 2012). The Westar Energy Substation is zoned as SU-Special Use within the AG-Agricultural District zoning designation. Existing land use for the area east of US-24 known as Rocky Ford is consistent with the County zoning designations for single family residential.

3.3.2 ENVIRONMENTAL IMPACTS

The proposed wind turbine project would not change the existing land uses of the KSU property. The KSU Department of Animal Sciences and Industry would continue to use the property north of Purcell Road as pasture after the turbine is installed and disturbed areas are restored. It could be necessary for the Department to delay releasing cattle into the area to avoid conflicts during construction and for the safety of the workers and the cattle. Temporary disturbance of approximately 2 acres and the long-term land commitment and presence of the wind turbine would not measurably change how the land is used by KSU.

Installing the wind turbine on KSU property at the preferred site would be for university purposes, but it would not be compatible with Riley County's agricultural zoning designation. Wind turbines are an allowable use in agricultural zoning provided applicable use-specific standards are met. *Section 22-Special Uses* of the Riley County zoning regulations (Riley County 2009a) provides for review of commercial wind energy conversion systems in agricultural zoning. The Zond Wind Energy Project would not be a commercial system following the definition in *Section 22-Special Uses* because the primary purpose of KSU's project is not the sale, resale, or off-site use of electrical power. However, proper zoning requirements would be addressed and followed by KSU by obtaining a special use permit

for the wind turbine. Most of those requirements for obtaining a special use permit are addressed throughout this EA. Although zoning restrictions would impact the project, compliance with Riley County special use provisions is expected to be achievable.

Installation of the wind turbine would convert approximately one-quarter acre of pasture to a non-agricultural use. The farmland conversion impact rating assessment completed jointly by the NRCS and DOE indicated the project site has a low relative value as productive farmland.

KSU's wind energy project would not change the zoning or land uses of areas surrounding the project site. The surrounding area would continue to be used for university purposes, agriculture, and single family residential areas.

3.4 Biological Resources

The biological resources of interest include common plants and animals, species afforded special protections, and the vegetation communities on and in the vicinity of the project site.

3.4.1 AFFECTED ENVIRONMENT

View of Typical Vegetation at Project Site

The project site, approximately 2 acres, is in the outer reach of the Manhattan urban area and is part of the broader geographical region of the Flint Hills and the Eastern Tallgrass Prairie Conservation Region of Kansas. The project site sits atop a bluff overlooking the Big Blue River and the Kansas River valleys.

The vegetation cover of the project site is dominated by warm season grasses used for pasture. Common native prairie grasses and forbs observed on the project site included bluestem, Indiangrass, switchgrass, goldenrod, and yarrow. Hardwoods in the draws surrounding the project site and common in the floodplain along the Big Blue River include eastern red cedar, sumac, dogwood, cottonwood, hackberry, and elm.

Wildlife typically found occupying and using prairie grasslands and pasture include small rodents and mammals (mice, moles, gophers), furbearers (rabbits, skunks, squirrels, foxes), upland game birds (pheasants, prairie chickens), birds (meadowlarks, sparrows, doves, cowbirds), raptors (hawks, owls), reptiles (snakes), and big game (deer). Shorebirds, wading birds, and waterfowl would be common near the open water and riparian habitat of the Big Blue River and Tuttle Creek Lake. Bald eagles can be observed roosting and feeding during the winter months at Tuttle Creek Lake and at Rocky Ford State Fishing Area on the Big Blue River.

The big brown bat is the most common bat species in Kansas. They use barns, bridges, attics, and old buildings for maternity colonies, and hibernate in caves, rock crevices, mines, and buildings (GPNC 2012). Brown bats forage over water, forest edges, and fields from dusk to midnight.

The species federally listed under the Endangered Species Act known to occur within Riley and Pottawatomie counties are the interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and Topeka shiner (*Notropis Topeka*). The endangered tern and threatened plover are shorebirds. Their habitat includes barren areas near water such as sandbars and shorelines. The threatened shiner is a small minnow known to occur in the Big Blue River watershed.

3.4.2 ENVIRONMENTAL IMPACTS

Disturbing the ground surface of the project site to construct and install the wind turbine would have a temporary direct impact on approximately 2 acres of prairie grassland vegetation, currently used for pasture and by wildlife. The project site is surrounded by similar undisturbed vegetation. Surface disturbance and construction activities could facilitate the establishment of non-native noxious weeds, such as quackgrass, field bindweed, and hoary cress. Aggressive non-native noxious weed species could become established if ground disturbance is extensive and lengthy. However, the small size of disturbance for the project and bare soils stabilized with native grass seed and mulch after construction would minimize the risk of noxious weeds from becoming established. Preventive measures such as monitoring and eradication would be implemented to reduce weeds from invading the project site after ground disturbance occurs. The areas disturbed and compacted by construction would be overseeded to accelerate the regrowth of the native prairie grasses.

Construction and installation activities would displace common wildlife that inhabit or use the project site for foraging or cover and potentially cause direct mortality of less mobile subterranean species, such as moles. Similar habitat on adjacent pasture and open land would support displaced species. The typical wildlife species that could be impacted are widely distributed; thus, loss of some individuals and habitat would not measurably impact the population throughout their range.

The proximity to urban development and the presence of existing physical structures (substation, transmission lines, and communication tower) already constrain the use of the project area for grassland nesting birds, such as the prairie chicken and pheasant. However, if ground disturbing activities for the wind turbine are scheduled to occur during breeding season (generally April through mid-July), the project site would be surveyed by a qualified biologist to confirm the absence of nests and nesting activity to avoid impacting migratory birds. If found, active nests (containing eggs or young) would be avoided until they are no longer active or the young birds have fledged. The Kansas Department of Wildlife, Parks, and Tourism would be contacted for guidance on appropriate avoidance measures for specific species and distances to keep away from active nests.

Tuttle Creek Lake and the Rocky Ford State Fishing Area attract waterfowl and eagles. Studies indicate that waterfowl do not experience high mortality caused by collisions with wind turbines (USFWS 2009; Derby et al. 2009). Only the minimum required obstruction lighting would be installed. To minimize the attraction of night-migrating birds, red flashing (strobe) lights would be used instead of solid or pulsating (beacon) lights. If the final design includes security lighting near the wind turbine, the lights would be shielded downward to avoid attraction by nocturnal species.

The developed area between the project site and roost sites near the Rocky Ford State Fishing Area does not provide valuable foraging or nesting habitat for eagles or fragment any such habitat. The USFWS and Kansas Department of Wildlife, Parks and Tourism did not express any concerns over potential impacts or conflicts between the wind turbine and eagles or other migratory birds in the project area.

The project area is not known to be good habitat for bats. Bat fatalities near commercial wind farms are mostly foliage-roosting and tree cavity-dwelling species which migrate long distances (Kunz et al. 2007), of which the big brown bat is not.

The project site does not provide suitable habitat for the least tern or piping plover, and is far from potential Topeka shiner habitat. The USFWS concurred with DOE's determination of no adverse effect to federally listed species, thereby concluding agency consultation pursuant to Section 7 of the Endangered Species Act. Appendix B includes the correspondence from USFWS.

3.5 Cultural Resources

Cultural resources are the physical remains of past human activity and include prehistoric and historic sites, structures, features, or locations considered important to a culture or a community for scientific, traditional, religious, or other reasons. Section 106 of the National Historic Preservation Act addresses historic properties, which are defined as properties included in the National Register of Historic Places or that meet the criteria for inclusion in the National Register.

3.5.1 AFFECTED ENVIRONMENT

The area of potential effect for the Zond Wind Energy Project is atop the bluff north of Purcell Road and west of US-24, between the Westar Energy Substation and west and south of the Cox Communications tower. Bluff top locations in the region hold high potential for prehistoric Woodland period (AD 1-1000) burial mounds or cairns. Two features atop a nearby bluff were identified on an 1888 map as burial mounds.

The KSU Department of Sociology, Anthropology, and Social Work completed an archaeological reconnaissance (Ritterbush 2011) of the area of potential effect for the project. A low indistinct rock scatter that was identified is of the form comparable to known prehistoric burial sites in the region. The stones comprising the feature do not appear to be directly associated with a natural limestone outcrop and are located at or near the upper-most point of the bluff, both are factors which compare favorably to known prehistoric upland burial features. No artifacts were noted on the surface around this feature. The feature was recorded as site 14RY673, a possible prehistoric burial site.

The Rocky Ford School is outside the area of potential effect and approximately one-half mile from the project site. Located at the intersection of US-24 and Barnes Road, the one-room limestone schoolhouse was listed in the National Register in January 2012 for its educational and architectural significance as part of a multiple-property nomination of historic public schools in Kansas (KHS 2012).

3.5.2 ENVIRONMENTAL IMPACTS

Site 14RY673 could possibly be the remains of a prehistoric burial feature. The turbine foundation, distribution line, and construction staging and lay down areas would be located to avoid impacting the feature. All land modifying activities associated with erecting the wind turbine and any other construction in the area would be prevented from disturbing the feature. A temporary fence was constructed around the burial feature during the substation construction and would be maintained to ensure the feature is avoided and not disturbed during construction and installation of the wind turbine. Access to the wind turbine and operation and maintenance activities would not occur near or around the burial feature.

Storm water runoff from disturbed ground surface could accelerate erosion and potentially impact the burial feature. The feature is at a slightly higher elevation than the turbine foundation location and installation of erosion control measures would prevent runoff, thereby eliminating the possibility for impacting the feature.

Students, faculty, construction workers, and vendors would have access to the project site to construct, operate, and maintain the wind turbine, but these activities would not occur near or around the burial

feature. KSU would develop a cultural awareness program to inform those having access to the project site of the historic importance of maintaining the integrity of the burial feature, and of the legal requirements to avoid disturbance to prehistoric human burial sites under the *Kansas Unmarked Burial Preservation Act* (Kansas Statutes Annotated 75-2741 through 75-2754).

The wind turbine would be visible from the intersection near the historic Rocky Ford School. Because there are numerous overhead transmission lines, poles, and the Cox Communications tower visible from the schoolhouse, the wind turbine would not be the only vertical element in view that would change the historic integrity or viewshed of the schoolhouse. Section 3.9 (and Figure 3-7, observation location 4) describes the visual impacts of the wind turbine.

If cultural remains (bones, artifacts) are encountered during construction, those activities would immediately cease to reduce impact to the encountered resources. The SHPO would be contacted to assess the situation and measures would be taken to identify and treat (mitigate) the resources before construction could resume.

As part of their required consultations with the SHPO under the National Historic Preservation Act (NHPA), DOE determined that providing federal financial assistance for the wind energy project would not adversely affect historic properties provided the avoidance measures (fencing, erosion control, and cultural awareness program) are implemented by KSU. DOE consulted with the SHPO and American Indian tribes in accordance with Section 106 of the NHPA. None of the four tribes consulted provided a response or request for additional information. The SHPO accepted the findings of the archaeological reconnaissance and concurred with DOE's determination of no effect, thereby concluding the Section 106 consultation process.

3.6 Health and Safety

Risks to the health and safety of workers and the public for a wind turbine project can include construction hazards, exposure to electromagnetic fields (EMF), interference with radar signals, hazards to airspace and aircraft, and hazards from ice throws. Health effects from exposure to turbine noise and shadow flicker by the public are addressed in Section 3.7 and Section 3.9, respectively.

3.6.1 AFFECTED ENVIRONMENT

The project site is on KSU property that is predominantly open pasture land with the Westar Energy Substation and overhead transmission lines nearby. The property is fenced and a locked gate limits vehicle access to the site to authorized KSU and Westar Energy personnel. Safety and health considerations include exposure to seasonal environmental elements and pests, and proximity to the substation and transmission lines. The EMF around the transformers at the substation diminishes to background levels within a few feet. The EMF exposure from high voltage overhead lines decreases rapidly with increasing distances and are at background levels at distances of about 300 feet (Xcel Energy 2012).

The Manhattan Regional Airport provides commercial and general aviation services. It is located approximately 7 nautical miles (8 linear miles) southwest of the KSU wind energy project site. Marshall Army Airfield supports the military mission of Fort Riley and is located 14 nautical miles (16 linear miles) southwest of the KSU project site. The FAA monitors air safety and evaluates structures that could be hazardous to the safe and efficient use of navigable airspace by aircraft. The FAA evaluates any structure exceeding 200 feet above ground level or located within certain distances from public use or military airports. Based on this evaluation, the FAA requires that structures, like wind turbines, have

specific obstruction markings, (such as certain paint colors and patterns) and lighting to avoid being a hazard to air navigation.

Doppler weather radars (Next Generation Weather Radar – NEXRAD) detect weather targets and storm-scale winds at long ranges to generate forecasts and warnings for significant weather events. The National Weather Service Radar Operations Center operates the Topeka NEXRAD, which is located about 22 nautical miles southeast of the KSU project site.

Fort Riley hosts a digital airport surveillance radar (DASR) used by air traffic controllers at Marshall Army Airfield and the Kansas City Air Route Traffic Control Center. The DASR system detects aircraft position and weather conditions in the vicinity of civilian and military airfields. It provides primary surveillance radar coverage up to 60 nautical miles and secondary surveillance radar coverage up to 120 nautical miles.

3.6.2 ENVIRONMENTAL IMPACTS

Necessary elements for an accident or environmental risk include the presence of the hazard itself together with an exposed population. Wind turbine construction and operation expose workers to hazards associated with confined spaces, heights, high voltage, and hoisting and rigging operations. Statistics for types and numbers of accidents specific to the wind energy industry in the U.S. are not available (AWEA 2012a).

3.6.2.1 Construction Safety

The safety of construction workers would be the responsibility of the contractors hired by KSU to construct and install the wind turbine. Implementing proper safety practices and maintaining equipment would prevent most accidents. Contractors' health and safety plans would address procedures to minimize accidents and would describe project- and site-specific emergency response actions. Crane safety requirements and clear zones would be specific to the project site to protect workers, and crane operators would have the appropriate training and licenses to work in the State of Kansas. Personal protective equipment to avoid hearing loss and prevent falls would be worn by workers. Adhering to Occupational Safety and Health Administration regulations and following construction safety advisories issued by the American Wind Energy Association would minimize the potential for safety or health impacts to construction workers. Any KSU faculty and students observing construction activities would adhere to the construction contractors' safety requirements and remain in clear zones unless escorted by the contractors.

3.6.2.2 Operations and Maintenance Safety and Security

The existing locked gate and fence deter unauthorized access to the project site by the public. Other than construction contractors, only authorized Westar Energy employees and KSU faculty, students, and vendors would have access during construction and after the wind turbine is installed and operating. Appropriate safety signs would be posted on or near the tower, transformer, and other equipment to warn of possible hazards, such as high voltage. Access by the public would continue to be restricted by the locked gate and the no-trespassing signs that are installed on the gate and fence to deter unauthorized access for safety or security reasons.

The KSU Department of Electrical and Computer Engineering faculty and students are subject to the KSU risk management program (KSU 2008). The Department would prepare a risk management and safety plan to specifically address the Zond Wind Energy Project to ensure that established University policies and procedures are followed for a safe work environment for faculty and students conducting

research with the wind turbine. Faculty, students, and vendors operating and maintaining the wind turbine would be exposed to hazards specific to the wind industry, and would receive training in worker exposure and use of personal protective equipment to prevent injuries. Only appropriately trained and experienced people would have access to the internal tower and turbine systems to conduct maintenance. Faculty, staff, and students from the KSU Department of Animal Sciences and Industry with access to the area would be informed of the security and safety procedures to follow when around the wind turbine.

3.6.2.3 Blade and Ice Throw

There are known incidents of wind turbines collapsing or blades dropping or being thrown. Accident consequences and safety risks from structural collapse would be confined within the fall distance of the blade height of the turbine, or about 250 feet away from the base of the Zond turbine model. The whole blade or fragments of the blade could be thrown from the turbine if the rotor fails due to extremely high winds, excessive rotor speed, electrical system failure, or manufacturing or installation defects. A throw analysis completed for a wind turbine with a blade height of 423 feet (177 feet higher than the KSU Zond turbine) determined a maximum blade throw of 565 feet (Epsilon 2010). Based on that analysis, the throw distance would likely be less with the Zond turbine because of its shorter blade height and different operating parameters (rotor speed, wind speed). National and world standards recommend a minimum setback distance of 1.5 to 3 times the total turbine (blade) height. The setback from property boundaries and public roads required for the Riley County special use permit is 1.5 times the total turbine (blade) height, which would be 369 feet (1.5 x 246 feet) for the Zond turbine. KSU controls the property within the required setback and beyond the expected fall or throw distances. The nearest receptor to the project site is almost 1,000 feet away and is outside the setback and throw distances of the Zond turbine.

Ice can form on wind turbines under conditions of low temperatures, precipitation, and heavy fog, and can be thrown from rotating blades or break loose and fall to the ground. Ice buildup on blades generally results in an imbalance of the rotor and detectable vibration that would automatically shut down the turbine. In most cases, ice falls within a distance from the turbine equal to the tower height and very seldom does the distance exceed twice the total turbine height (MDEP 2012). Twice the total turbine (blade) height for the Zond model is 492 feet (2 x 246 feet). No receptors are within this distance.

3.6.2.4 Electromagnetic Fields

Wind power produces electromagnetic fields (EMFs) much like any other source of power. The EMFs originate from the turbine generator, transformer, and transmission line to the electrical grid. Because the Zond wind turbine generator would be 164 feet above the ground, the EMFs would be well above any people who may be in the area. The EMFs from the transmission line would be comparable to household appliances. Wind turbines are not considered a significant source of EMF (NCCEH 2010).

3.6.2.5 Airspace

The FAA has determined the KSU wind turbine does not exceed obstruction standards and would not be a hazard to air navigation provided the turbine is properly marked and lighted. The turbine must be painted white for daytime visibility and have steady or flashing red aviation obstruction lights for nighttime visibility. Appendix B includes the correspondence from the FAA that references the marking and lighting specifications.

3.6.2.6 Weather Radar

Rotating wind turbine blades can appear as clutter in the NEXRAD base data and affect detection of storm characteristics. The clutter results from numerous rotating blades and is thereby associated with

wind farms and not generally a single turbine. Wind farms within 10 nautical miles of a NEXRAD have the potential to impact forecast and warning operations of the radar (NOAA 2012). The KSU wind energy project is a single turbine located more than twice this distance from the Topeka NEXRAD.

3.6.2.7 Surveillance Radar

Wind turbines located in the line-of-sight of surveillance radar can adversely impact the ability of radar to detect and track aircraft or other aerial objects (referred to as targets). The magnitude of the impact depends on the number and location of the wind turbine (DOD 2006).

Line-of-sight is established when a wind turbine can be seen optically, by radar waves, or by both from a radar with no geological formations, buildings, or vegetation completely obstructing the given path. An object in the radar line-of-sight creates a shadow zone of lower radar signal strength that can diminish or obstruct detection of targets. Although a single wind turbine can block the transmission of radar waves, the blockage would be relatively small because of the turbine's slender size, resulting in a negligible shadow zone (DOD 2006).

The line-of-sight from the DASR on Fort Riley to the KSU wind turbine was calculated with a simple digital elevation model using ground elevations to determine the visibility of the wind turbine. Figure 3-1 shows the results of this modeling. The intervening terrain would be close to completely masking the wind turbine; however, with the heights of the radar and turbine included, the wind turbine would be in the line-of-sight of the DASR.

Multiple turbines located in close proximity of each other cause diffraction of radar waves that appears as clutter to the radar. The amount of clutter increases in direct proportion to the number of turbines within the line-of-sight of the radar, which increases the possibility of lost or false targets. A single turbine located a reasonable distance away from a radar would have minimal impact on the ability of that radar to successfully detect and track all potential targets of interest (DOD 2006). Complex computer models and mathematical equations can be used to determine the extent of interference of a wind turbine located within the line-of-sight of radar. These models and equations have been used to conduct analyses of the aggregate effect of numerous turbines on surveillance radar at Department of Defense installations.

An analysis for wind farms interfering with the DASR at an Air Force base (Losco & Collick 2012; Solano County 2011) is used to compare and to qualitatively assess the potential for the single KSU wind turbine to significantly interfere with the DASR on Fort Riley. Simulations were conducted to predict the potential impacts on air traffic operations of adding 140 more turbines to the more than 800 turbines covering an area of wind farms located between 5 and 9 nautical miles from the Air Force base. The probability of detecting a target below 4,000 and 10,000 feet was reduced by 2.8 and 3.2 percent, respectively (Solano County 2011). The Air Force concluded that an average degradation of 5 percent in probability of detection across the entire area would be an insignificant operational impact and would not impact air safety (Losco & Collick 2012). Based on this comparison, any reduction in probability of detecting a target in the shadow zone created by the KSU single turbine located 14 nautical miles from the Fort Riley DASR that would change air safety is not expected.

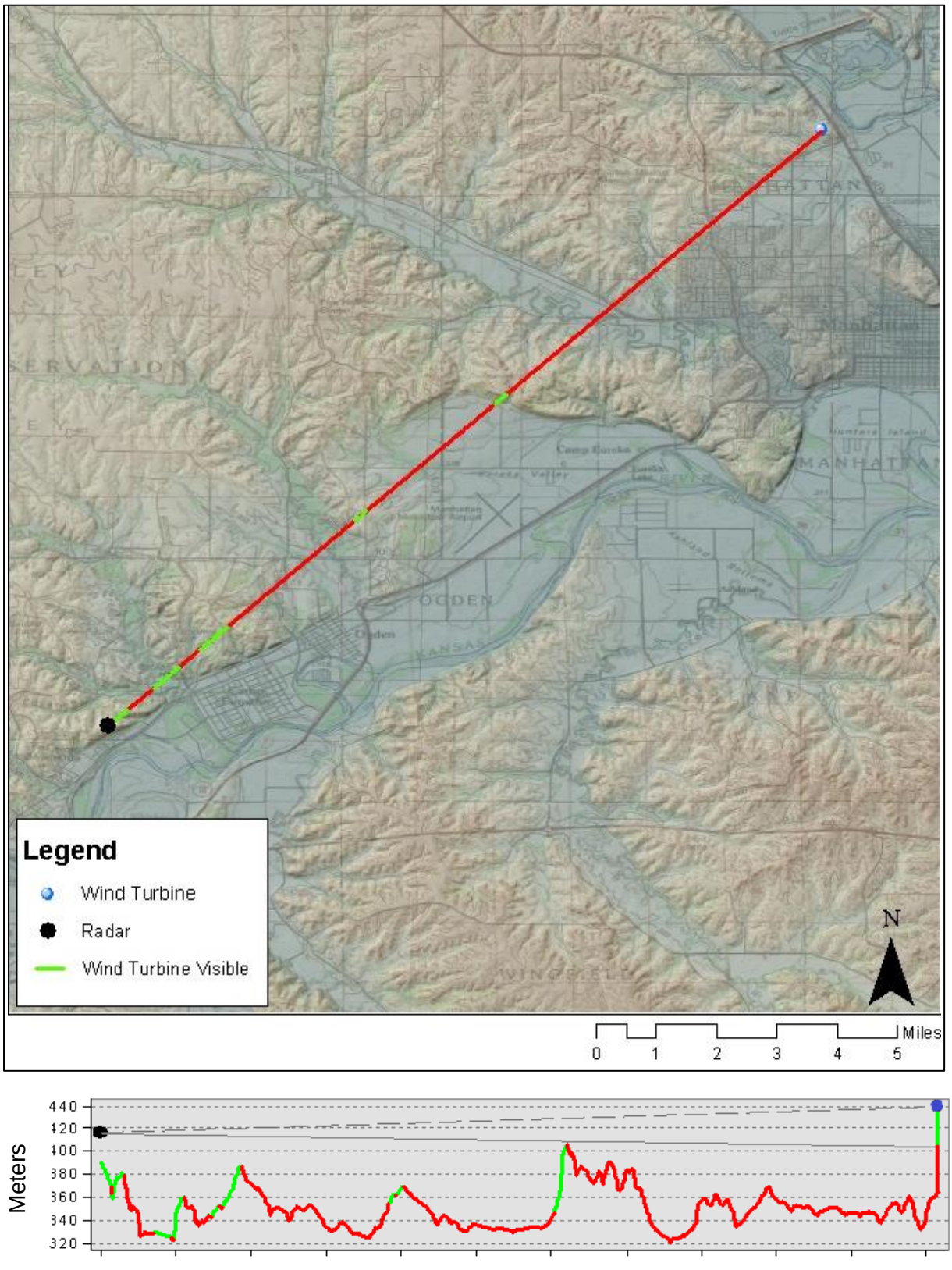
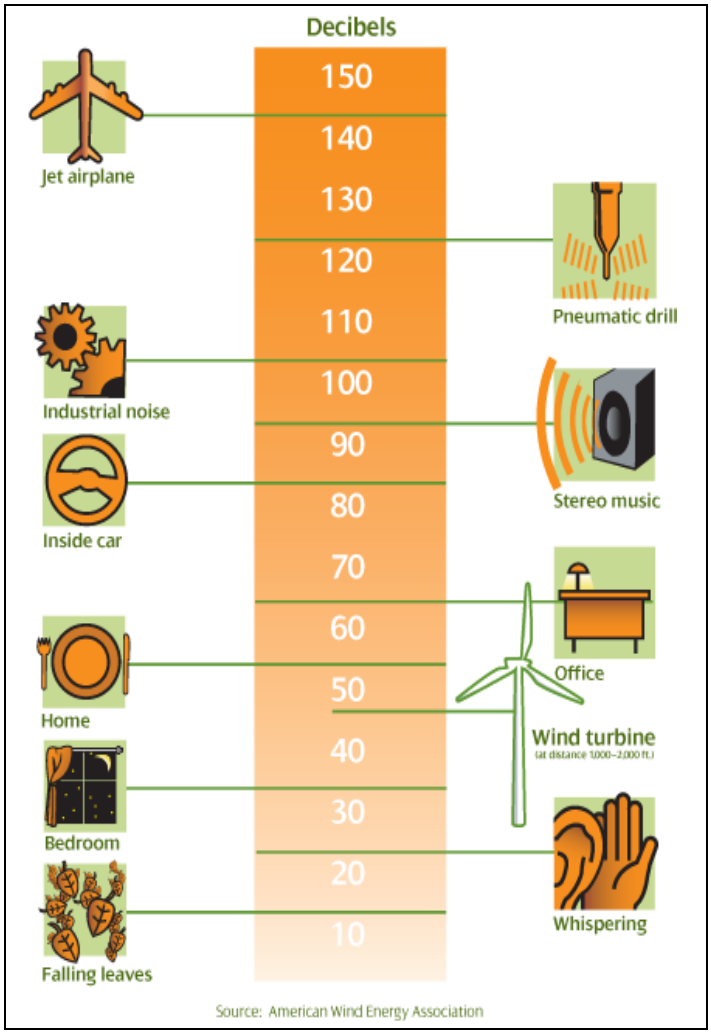


Figure 3-1. Line-of-Sight Between Fort Riley Digital Airport Surveillance Radar and KSU Wind Turbine

3.7 Noise

Noise is defined as unwanted sound that interferes with normal activities or in some way reduces the quality of the environment. Response to noise varies according to its type, its perceived importance, its appropriateness in the setting and time of day, and the sensitivity of the individual receptor.



A decibel (dB) is the physical unit commonly used to describe sound pressure levels. Sound measurement is further refined by using an "A-weighted" decibel (dBA) scale that more closely describes how a person perceives sound.

Noise sensitive receptors are facilities or locations where a state of quietness is a basis for use, or where excessive noise interferes with the normal use of a particular facility or location. Noise sensitive receptors include schools, hospitals, churches, libraries, homes, and parks. Some species of wildlife may also be sensitive to noise. Figure 3-2 shows typical sound levels for common noise sources.

3.7.1 AFFECTED ENVIRONMENT

The project area is north of the urban core of the City of Manhattan in a semi-rural setting of Riley County. Sources of ambient noise in the project area include traffic on US-24 and Purcell Road, farm machinery, Westar Energy Substation, overhead transmission lines, and wind. Because of the semi-rural setting, loud noises are likely few and intermittent. Intermittent sources of noise include aircraft from the regional airport and from Fort Riley.

Figure 3-2. Noise Source Sound Levels

Noise sensitive receptors within 3,280 feet (1,000 meters) of the wind turbine site are residences, with a church located to the southeast at the periphery of this distance. Table 3-1 lists the ambient sound pressure level measurements at six representative receptors, as shown on Figure 3-3. Measurements were taken before sunrise with little to no traffic on US-24 and with vehicles passing by. Although single measurements only provide a snapshot of the noise environment, the results are comparable to commonly accepted sound levels for noise sources.

3.7.2 ENVIRONMENTAL IMPACTS

The wind energy project would temporarily generate noise during construction and installation of the wind turbine and permanently introduce a new source of noise to the project area during operation.

Table 3-1. Sound Levels Measured at Receptor Locations

Receptor	Measurement[1] (dBA) No Traffic	Measurement (dBA) With Traffic	Distance[2] (Feet) from Turbine
1 – House	<50	62	2,100
2 – House	<50	54	1,000
3 – House	<50	62	1,300
4 – Mill Road/Rocky Ford Avenue	<50	53	1,500
5 – Chandler Drive/Rocky Ford Avenue	50	63	1,200
6 – Rocky Ford Avenue/Rocky Ford Circle	51	65	1,900

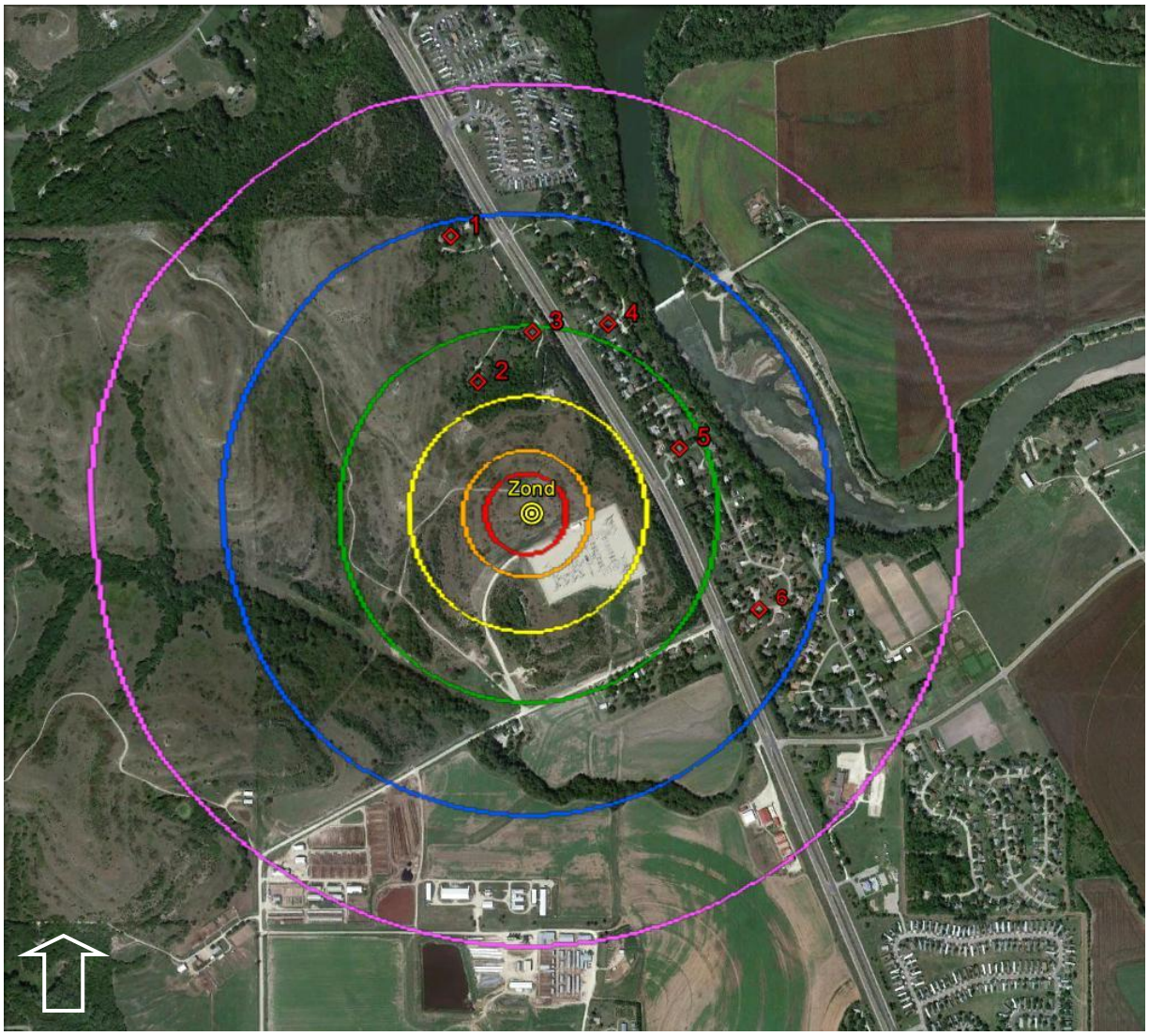
[1] Meter used was limited to detecting sounds above 50 dB. [2] Distance was rounded to nearest 100 feet.
Source: KSU 2010

Construction and installation of the wind turbine and distribution line would temporarily increase noise beyond ambient levels intermittently during daylight hours for approximately two to four months. Equipment such as a backhoe, trencher, cement mixers, transport trucks, and cranes would be sources of construction noise. Noise levels from construction sites measured approximately 90 dBA at a distance of 50 feet from the center of the site (CERL 1978). Sites in flat-lying areas with minimal vegetation experience noise attenuation at a rate of 6 dBA for each doubling of distance (50, 100, 200, 400, 800 feet) between the noise source and the receptor, and a further reduction of 5 to 10 dBA if there is dense vegetation or a break in the line-of-sight between source and receptor (CERL 1978). A receptor located at 800 feet or more from the wind turbine site could hear intermittent construction noise levels at 68 dBA and less, which is comparable to a busy office or automobile traffic. Because of the higher ground elevation at the project site and vegetation surrounding the receptors, the level of construction noise would likely be less.

Noise generated by an operating wind turbine is primarily from the rotating blades. According to data from the American Wind Energy Association, the noise level of a wind turbine at 1,000 to 2,000 feet from a receptor averages near 50 dBA (Figure 3-2). The industry standard for predicting acceptable noise levels and distances from residences as receptors is three times the blade tip height (Rogers 2006). For the Zond Z-50 model turbine, this distance would be 738 feet (3 x 246 feet). The nearest receptor to the wind turbine is approximately 1,000 feet (Table 3-1) and would be considered an acceptable distance away from the wind turbine based on this standard.

The noise produced by the Zond wind turbine was also mathematically calculated using blade tip speed, power output of the turbine, and hemispherical noise propagation to estimate the sound pressure level at distances up to 3,280 feet (1,000 meters) from the turbine. Figure 3-3 shows the noise produced by the Zond turbine is estimated to be less than 50 dBA at the receptor locations. Noise levels would be lower with slower wind speeds and would likely be masked by traffic noise. Higher wind speeds raise ambient noise levels (wind blowing through trees) that would likely mask higher turbine noise. Turbine noise combined with traffic noise at the closest receptor was less than a 3 dBA increase (KSU 2010), which is the minimum increment generally detectable by the human ear. Turbine noise would therefore not measurably increase ambient noise conditions at receptors.

Ambient noise conditions near the Rocky Ford State Fishing Area include the falls of the Big Blue River. Estimated turbine noise at this location would be between 35 and 45 dBA (comparable to a library or quiet suburban area), but it would be masked by the much louder noise generated by the water rushing over the dam. Turbine noise would not affect eagles and waterfowl roosting near the fishing area during the winter months.



Source: KSU 2010, modified

Figure 3-3. Zond Wind Turbine Noise Levels at Receptors

The Riley County zoning regulations for the *Section 22-Special Uses* permit set noise standards for siting commercial wind energy systems. The noise level caused by the operation of a commercial system shall not exceed 65 dBA measured 5 feet above ground level at the property line coincident with or outside the project boundary (Riley County 2012). The single turbine for the KSU wind energy project would meet the Riley County noise standards because the noise contour greater than 60 dBA extends about 300 feet from the turbine (Figure 3-3) and is entirely on KSU property.

3.8 Transportation

Transportation addresses the logistics of getting wind turbine components, equipment, and construction workers to the project location.

3.8.1 AFFECTED ENVIRONMENT

The project site is atop a bluff north of Purcell Road and west of US-24. The Zond wind turbine is stored at the Jeffrey Energy Center northwest of St. Marys, Kansas. The distance between the project site and Jeffrey Energy Center is about 38 miles traveling east on US-24 and north on State Route 63 at St. Marys. Figure 3-4 shows the storage location of the wind turbine and proposed transport routes to the project site.

Purcell Road is a local gravel road less than a mile long used primarily to access a few rural residences, Westar Energy Substation, and KSU field research facilities. US-24 (Tuttle Creek Boulevard) is a principle arterial road that runs north-south through the east side of the City of Manhattan. It is a four-lane, divided road with turn lanes, traffic control signals, and paved and graveled shoulders. A possible segment of the route for transporting the wind turbine through Manhattan is McCall Road. It is a minor arterial road with four lanes, center turn-lane, and traffic control signals. McCall Road serves the commercial and industrial facilities located in the "V" formed by the directional change of US-24 in the southeastern part of Manhattan.

US-24 going east from Manhattan is a four-lane, divided highway to Wamego and remains four lanes with left-turn lanes through the town. At the east end of Wamego, US-24 transitions to two lanes with no turn lanes to and through Belvue and St. Marys. State Route 63 is a two-lane, major collector road going north from US-24.

Annual average 24-hour traffic counts on US-24 through Manhattan ranged from 12,900 vehicles near McCall Road, 21,100 vehicles near Casement Road, to 10,400 vehicles at Marlatt Avenue (KDOT 2010). On the 2-mile stretch north of Marlatt Avenue which passes Purcell Road, the number of vehicles decreased by 30 percent to 7,360 (KDOT 2010).

3.8.2 ENVIRONMENTAL IMPACTS

Vehicle traffic on Purcell Road and US-24 would increase during the transport, construction, and installation of the wind turbine. Transport of the wind turbine could involve seven or eight hauls via truck pulling a blade, dolley, or flatbed trailer. The turbine tower would be delivered in three separate sections to the project site for assembly, and the three blades, nacelle, and hub would each be delivered by separate trucks. The cranes needed to lift and assemble the turbine components would also be transported to and assembled on the project site. Depending on the crane model and main boom length, it could take 10 to 30 trucks to transport the two cranes to the project site. Based on information from other single wind turbine projects (DOE 2011a, DOE 2011b), the construction workforce would be small (ranging from 8 to no more than 20 construction workers at a given time) and the construction duration would be short (two to four months).

The size of the loads would affect local traffic more so than the volume of construction traffic. The transport trucks would be oversized or overweight loads subject to permitting by the Kansas Department of Transportation (KDOT). As part of the permitting process, KDOT would review the proposed route for underpass height, bridge weight restrictions, and narrow construction zones. The trucking company contracted by KSU to transport the wind turbine would coordinate with KDOT, and with Pottawatomie County, Riley County, and the City of Manhattan as necessary, to acquire the appropriate permits and to finalize the route and timing of transport.

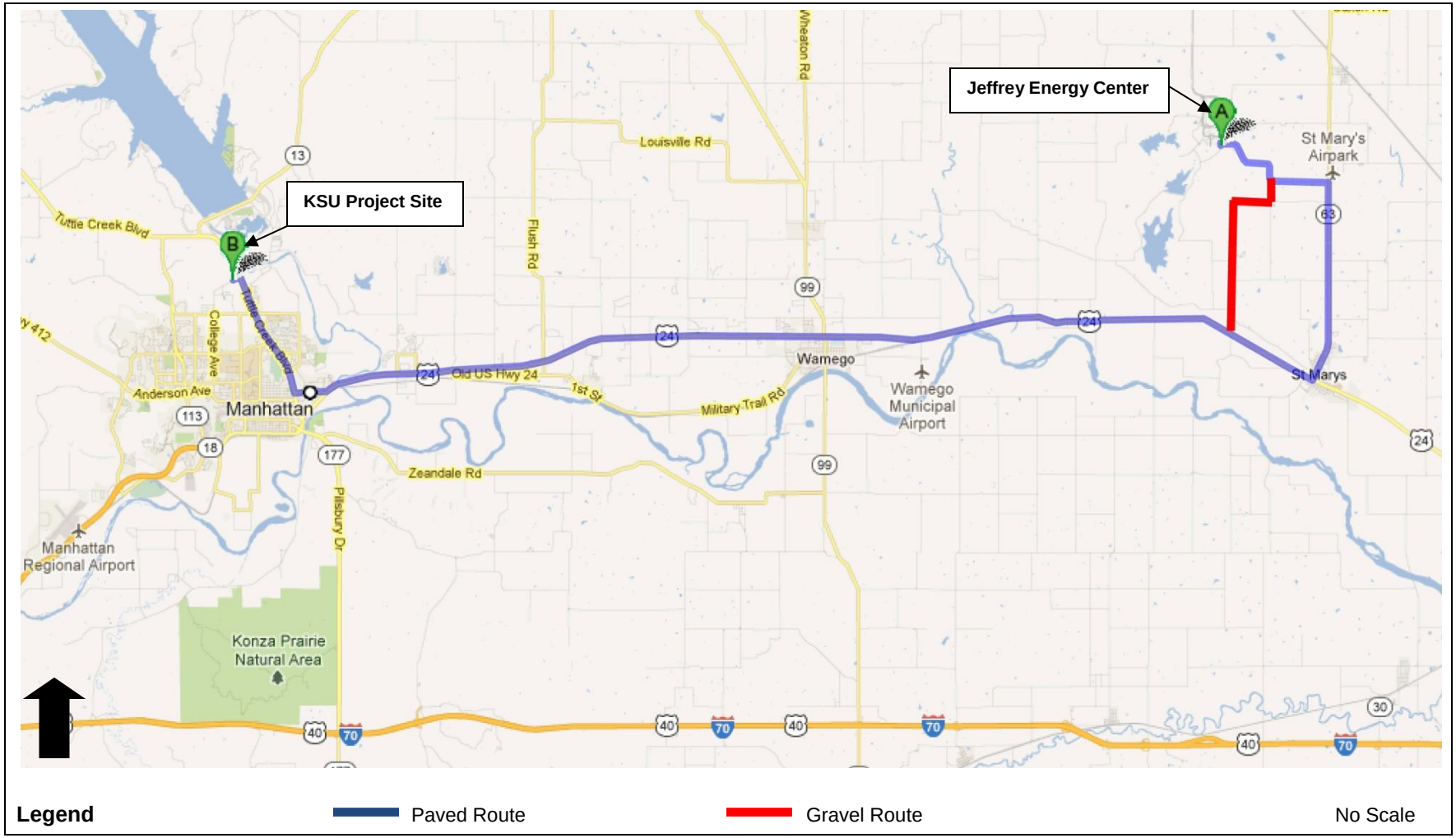


Figure 3-4. Proposed Transport Routes from Jeffrey Energy Center to KSU Project Site

The turbine components could be transported one at a time or in a convoy. The transport trucks would slow traffic along the route, particularly on the two-lane segments because of the delay in passing oversized trucks. The trucks would likely queue on Purcell Road to wait to be unloaded at the project site. Southbound traffic on US-24 could have to be slowed or stopped while the transport trucks turn onto Purcell Road. Although drivers on the two-lane segments of the transport route and on Purcell Road would be temporarily inconvenienced, any impact would be minor because of the lower volume of traffic in these rural areas. Avoiding peak travel times through Manhattan would minimize delays of traffic on US-24 and McCall Road.

The overweight loads could create ruts in gravel roads, particularly if transport occurs during or after a large storm event. Gravel roads would be bladed to fix any road damage caused during the transport. If the final transport route is Jeffrey Road to State Route 63 through St Marys to US-24, the only gravel road segment would be Purcell Road near the project site. Approximately 5 miles of gravel road would be traveled between the Jeffrey Energy Center and US-24 if Riley Creek Road, Diamond Road, and Pleasant View Road are the selected route to US-24 (Figure 3-4).

Decommissioning the wind turbine would require equipment similar to that for installation and would likely have similar minor and temporary transportation impacts. Depending on condition, the wind turbine components could be cut up for easier removal and transport from the area, which could further minimize transportation concerns because of different types and sizes of haul trucks. The ultimate disposal location would dictate the type and extent of traffic impacts.

3.9 Visual Resources

Visual resources include the physical (natural and manmade) and biological features of the landscape that contribute to the visual character or scenic quality of an area. Scenic quality is a measure of the visual appeal of the landscape, which is subjective and varies among observers.

3.9.1 AFFECTED ENVIRONMENT

The project site is located atop a bluff overlooking the valley formed by the confluence of the Big Blue River with the Kansas River. The site is in the transitional area between the City of Manhattan urban edge and the rural character of Riley County. US-24 divides the higher rolling bluffs of prairie grasses, hardwood draws, and riparian drainages to the west from the lower floodplain croplands, river, and residential areas to the east. The surrounding area is predominately agricultural and rural residential.

The bluff top is approximately 145 feet above US-24 and Purcell Road. This rise in elevation and thick stands of mature trees along the roads shield the bluff top and western horizon from view by observers east of the project site. The visual character is influenced by the physical structures adding vertical components to the horizon that are visible above the trees. These structures include the Cox Communications tower, overhead transmission lines and poles to and from the Westar Energy Substation, and overhead power lines and poles that parallel US-24. The communications tower is 334 feet tall with the top elevation at 1485 feet. The substation power poles range from 80 to 95 feet tall with top elevations varying upwards to about 1300 feet.

Observers of the project site would predominately be northbound and southbound vehicle traffic on US-24, eastbound traffic on Purcell Road, northbound traffic on College Avenue, and residents east of US-24 in the Rocky Ford neighborhood and River Chase Mobile Home Park.

3.9.2 ENVIRONMENTAL IMPACTS

A visual impact is the creation of an intrusion or noticeable contrast to the landscape that affects its visual character or scenic quality. Compatibility of introduced features within established views, together with public attitudes and individual perspectives, determine the subjective importance of the visual impact.

3.9.2.1 Visual Effects

The blade tip height of the wind turbine at 246 feet puts the top elevation at 1461 feet. Although the communications tower is 24 feet higher in elevation, the shape and color of construction materials of the wind turbine would make it a dominant vertical feature in the area. The dominance and noticeability of the turbine would vary by time of day, time of year, and weather conditions. It would be compatible with the other visible vertical features of overhead transmission lines, power poles, and the communications tower.

The visibility of the wind turbine would vary by location due to topography, development, and screening elements such as trees and buildings. The views from potential observation points were simulated to demonstrate changes to the visual character of the landscape from the physical appearance of the wind turbine. The observation points (Figure 3-5) were selected based on the likely direction of view by observers and where the communications tower was also visible. While observers from the River Chase Mobile Home Park would experience the most change to their views (Figure 3-6, observation location 2), the acceptance of that change would vary by observer based on attitude and perspective of wind turbines and their purpose. Figures 3-6 through 3-8 show the results of the visual simulation. The wind turbine is outlined in yellow to indicate the simulated view from observation locations 3 through 6.

Figure 3-5. Observation Locations for Simulated Views of the Wind Turbine

1: North view of turbine and communications tower from Westar Energy Substation.

2: South view of turbine, communications tower, and power poles from River Chase Mobile Home Park.

Figure 3-6. Simulated Views from Observation Locations 1 and 2

3: Northwest view of turbine, communications tower, and power poles from Rocky Ford School.

4: Northwest view of communications tower; turbine not visible in trees in Rocky Ford neighborhood.

Figure 3-7. Simulated Views from Observation Locations 3 and 4

5: Northeast view of turbine and communications tower from College Avenue.

6: Southeast view of turbine and communications tower from Bent Tree Drive at US-24.

Figure 3-8. Simulated Views from Observation Locations 5 and 6

The presence of heavy equipment and construction vehicles would contrast with the visual landscape of the project site during construction and installation of the wind turbine, but the topography shields the site from surrounding observers. The cranes would be visible to nearby observers when in the upright position. Decommissioning would involve similar activities and equipment as installation, and would be expected to have minor short-term visual effects along with the long-term change to the visual character of the area by eliminating the wind turbine.

3.9.2.2 Shadow Flicker

Shadows cast by rotating turbine blades can create a flickering effect across the ground and on stationary objects. The timing, duration, and intensity of shadow flicker are dependent on the angle and brightness of the sun and the distance and direction between the turbine and the receptor. Shadow flicker would only occur when blades are rotating; with bright direct sunshine sufficient to cast shadows; during the early morning shortly after sunrise or early evening before sunset; and to receptors generally within 10 rotor diameters of the turbine. It is generally accepted throughout the industry that shadow flicker effect is negligible beyond 10 rotor diameters (1,640 feet or 500 meters for the Zond wind turbine) because of the angles of the sun and blades and the changing light intensity (DECC 2011, MCEC 2013). While shadow flicker can be detected outdoors, it tends to be more noticeable indoors where windows face the turbine.

Shadow flicker is limited in time and location; it is not an everyday event or of long duration when it does occur (Allen 2011; AWEA 2008). An acceptable threshold for shadow flicker used throughout the industry and implemented by some states is no more than 30 hours per year. There is no evidence that shadow flicker causes any harmful health effects (MDEP 2012), but it can be considered an annoyance or nuisance by occupants or users of an area where shadow flicker occurs.

KSU conducted an analysis of the potential shadow flicker of the Zond wind turbine using a simple mathematical online calculator created by the Danish Wind Industry Association (KSU 2010). The analysis was limited based on the input parameters of the calculator (flat terrain, no obstructions, 100 percent blade rotation, year-round northern latitude with bright sun), and thus, the results were very conservative. Figure 3-9 shows the estimated extent of the shadow flicker zone under optimal conditions for shadows to occur, which is basically the worst case to assess adverse impact. These optimal conditions generate the longest duration of flicker and include bright sunshine, low angle of sun, rotating blades, wind direction and rotor orientation aligned with receptors, flat terrain, and no obstructions (vegetation or structures) between the turbine and receptors. Receptors located east of the KSU wind turbine would fall within the shadow zone shortly before sunset.

The length of time that shadow flicker could be noticeable by any receptor within the Zond wind turbine shadow zone would be much less than the acceptable industry threshold of 30 hours per year. With realistic meteorological conditions (percent sunshine, wind direction, and wind speed), vegetation obstructions, and 50 to 70 percent turbine operation, the duration of flicker at the receptors would more likely be less than 10 hours per year. This is comparable to a detailed shadow flicker analysis completed for a single, larger wind turbine in Butler County, Kansas (DOE 2011b). That analysis assumed 100 percent turbine operation, no vegetation or structural obstructions, and greater sunshine probabilities. With these assumptions, receptors within 1,640 feet (500 meters) of that Butler County turbine could experience shadow flicker less than 10 hours per year. It is therefore reasonable to conclude that receptors east of the smaller KSU turbine within the shadow zone of 1,640 feet would not experience shadow flicker more than 10 hours per year.

Source: KSU 2010, modified

Figure 3-9. Potential Shadow Flicker Zone

Approximately one-quarter mile of US-24 would be within the shadow zone of the wind turbine and drivers could experience shadow flicker. At the times when shadow flicker could occur, it would be comparable to driving during early or late day hours with sunlight passing through trees or between buildings. The short distance and the drivers' speed would likely make any flicker unnoticeable.

Should shadow flicker become an annoyance to any nearby receptor and the College of Engineering is contacted, KSU would discuss options with the affected receptor and use commercially reasonable options to remedy the annoyance on a case-by-case basis. Such options could include screening by planting trees or installing window awnings or shades, or programming the turbine to shut down during the brief periods of expected shadow flicker.

3.10 Unavoidable Adverse Impacts

The wind energy project would have unavoidable adverse impacts. Temporary unavoidable adverse impacts would include loss of prairie grasses and access to pasture during construction and installation of the wind turbine, a minimal increase in noise during construction, and traffic delays during transport of turbine components and construction equipment to the project site. Long-term unavoidable adverse impacts would include; loss of approximately one-quarter acre of grassland used as pasture that would be occupied by the wind turbine; introduction of a dominant vertical element to the visual character of the

area; and possible annoyance of some nearby residents from shadow flicker during certain times of the year.

3.11 Relationship Between Short-Term Use of Environment and Maintenance and Enhancement of Long-Term Productivity

Short-term use of the environment occurs during the life of the project, whereas long-term productivity refers to the time period after the project has been decommissioned, the equipment removed, and the land reclaimed and stabilized. Management of the project site is for university purposes, which currently is agricultural. The short-term use of the site for the wind turbine project would not affect the long-term productivity of the area for agriculture and other university purposes. When operation of the wind turbine was no longer practicable, it would be decommissioned, removed, and the site reclaimed for pre-project uses.

3.12 Irreversible and Irretrievable Commitment of Resources

An irreversible or irretrievable commitment of resources can be defined as the loss of future options. Irreversible effects result primarily from consumption or destruction of a specific resource that cannot be replaced within a reasonable timeframe, such as fossil fuels or soils. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, such as the destruction of a cultural site or extinction of an endangered species.

Labor, energy, materials, and capital would be committed for construction and installation of the KSU Zond Wind Energy Project. These resources would not be recovered. Construction would make permanent use of building materials; however, rare resources would not be consumed in the process. Fossil fuels would be irreversibly lost through the use of gasoline- and diesel-powered construction equipment. The construction materials, except to the extent they can be recycled, would be irretrievably committed.

Approximately one-quarter acre of land would be occupied by the wind energy project into the future until the operations are terminated. This land could be re-used for another wind turbine, or restored to its existing condition as pasture; therefore, the commitment of land is not irreversible.

4. CUMULATIVE IMPACTS

Cumulative impacts to the environment may potentially occur because of the additive effects of implementing the KSU Zond Wind Energy Project with other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

4.1 Other Projects

The impacts of the wind energy project are expected to be minor and localized so the spatial extent of potential cumulative impacts is limited to the general area of the project location. Past actions in the general area include the construction of the Westar Energy Substation and transmission lines completed in 2012. The Riley County Public Works complex is located about 4 miles to the west-northwest from the general area of the KSU wind energy project site. The complex includes four wind turbines ranging from 2.5-kW to 100-kW, with the blade height of the tallest turbine at approximately 180 feet. Present and foreseeable future actions include the ongoing operation and maintenance of the substation and Cox Communications tower, and the continued management of the KSU property in the general area for university purposes.

4.2 Potential Cumulative Impacts

The resources affected by the wind energy project discussed in sections 3.3 through 3.9 that would likely experience cumulative effects include land use, biological resources, cultural resources, health and safety, and visual resources. Because there are no noise sensitive receptors affected by the wind energy project, there would be no cumulative impacts to ambient noise levels. Impacts to transportation are short-term and there are no foreseeable actions affecting the roads and traffic in the general area.

4.2.1 LAND USE

Construction of the Westar Energy Substation permanently converted about 12 acres of KSU property used for pasture to gravel surface for the access road and substation, and rezoned the land from agriculture to a special use. Another one-quarter acre of that pasture land would be permanently converted and rezoned for the wind energy project.

4.2.2 BIOLOGICAL RESOURCES

About 12 acres of prairie grasses used as pasture and by wildlife were lost to the Westar Energy Substation and another 3 acres were temporarily disturbed for grading slopes and constructing a storm water detention basin. The temporary disturbance of another 2 acres for the KSU wind energy project would not have an adverse cumulative effect on prairie grass habitat and wildlife. There is ample similar habitat surrounding the project site for displaced wildlife until the grasses are reestablished on the disturbed areas. The wind turbine would be another vertical element in the landscape with the Westar Energy overhead transmission lines, Cox Communications tower, and four turbines at the Riley County Public Works complex that could increase the collision risk to birds and bats in the general area. Although the wind energy project would add cumulatively to this risk, the incremental increase in collisions would be very small or immeasurable. The USFWS and Kansas Department of Wildlife, Parks, and Tourism did not express concerns over adverse risks of collisions or increased mortality of birds or bats in the general area.

4.2.3 CULTURAL RESOURCES

An archaeological reconnaissance of the area occupied by the Westar Energy Substation was completed before construction. A prehistoric burial feature (14RY673) was observed near the substation site and the wind turbine location; there were no other historic properties observed. A temporary fence was installed to protect the burial feature from construction activities.

4.2.4 HEALTH AND SAFETY

Construction of the Westar Energy Substation and overhead transmission lines were completed in 2012, so health and safety issues for construction workers would be limited to those working on the wind energy project. The EMFs around the transmissions lines would be comparable to household appliances and EMFs from the wind turbine would be well above ground level and not an exposure risk. The FAA determined the transmissions line poles are not a hazard to air navigation and neither would the KSU wind turbine be a hazard. The four turbines at the Riley County Public Works complex are not subject to review by the FAA because they are not taller than 200 feet, and therefore, assumed to not be a hazard to air navigation.

The elevation plus the blade height of the 100-kW turbine at the Riley County Public Works complex is almost 100 feet higher than the blade height plus elevation at the KSU wind turbine location. A rough digital elevation model indicates the Riley County turbine is likely within the line-of-sight of the DASR on Fort Riley. Because there is approximately 4 miles distance between the Riley County and KSU wind turbines, they would not appear as clutter to the radar.

4.2.5 VISUAL RESOURCES

The KSU wind energy project would add another dominant vertical feature to the landscape with the existing communications tower and overhead transmission lines and poles; however, the wind turbine would be compatible with these other visible features. The wind turbines at the Riley County Public Works complex are too far away to be visible within the same viewshed as the KSU turbine. There are no known foreseeable actions with large vertical elements in the general area that could change views.

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Appendix A:
Public Scoping

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

November 8, 2012

TO: Distribution List

SUBJECT: Notice of Scoping – Kansas State University Zond Wind Energy Project

The U.S. Department of Energy (DOE) is proposing to provide Congressionally Directed Federal Funding to Kansas State University (KSU) to refurbish, install, operate, and maintain a 750-kilowatt (kW) wind turbine on KSU property north of Manhattan, Kansas. Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021), DOE is preparing a draft Environmental Assessment (EA) to:

- Identify any adverse environmental effects that cannot be avoided should this proposed action be implemented.
- Evaluate viable alternatives to the proposed action, including a no action alternative.
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.
- Characterize any irreversible and irretrievable commitments of resources that would be involved should this proposed action be implemented.

Project Description

A Zond Z-50 model wind turbine was donated to KSU to be used for education, research, and energy production. The proposed project involves refurbishing the turbine for use and installing it on KSU property north of the main campus. The Zond tower is 164 feet (50 meters) tall and each blade is 82 feet (25 meters) long for a total blade height of 246 feet (75 meters). A concrete pad approximately 40 feet square by 8 feet deep would be constructed for the turbine foundation.

A transformer would be installed near the base of the turbine and an electrical distribution line would connect the transformer to the electrical grid at the nearby Westar Energy substation. The distribution line would be installed underground for the entire distance between the substation and turbine, or would be on above ground poles for most of the distance and then placed underground as it approached the transformer. The length of the distribution line would be approximately 1,000 feet. An existing gravel road would be reinforced with additional gravel and be lengthened by approximately 200 feet to access the proposed site to install the turbine.

After installation, the KSU Department of Electrical and Computer Engineering would conduct different research projects with University students. When not used for research and education, the turbine would generate electricity that would be relayed to the grid and Westar Energy would directly reduce KSU's electricity consumption costs.

Project Location

The proposed location for the wind turbine is on KSU property approximately 3 miles north of the main campus in Manhattan, Kansas (Figure 1). The turbine would be located outside the city limits of Manhattan in the southeast quarter of Section 25, Township 9 North, Range 7 East of the 6th Principle Meridian in Riley County. The proposed site is located on the knoll north of Purcell Road and west of U.S. Highway 24 (Tuttle Creek Boulevard) as shown on Figure 2. The approximate layout of the site is shown on an aerial photo in Figure 3.

Environmental Review and Analysis

The EA will describe the environmental resources potentially affected by the project and assess the direct, indirect, and cumulative impacts on those resources from installing and operating the wind turbine. Mitigation measures to minimize or eliminate any impacts will be identified. The EA will evaluate potential impacts that may result from the project related to:

- Biological Resources
- Cultural and Historic Resources
- Health and Safety
- Noise
- Socioeconomics/Environmental Justice
- Visual Quality and Aesthetics

Alternatives

In the NEPA process, DOE is required to consider a reasonable range of alternatives to the proposed project. The EA considers alternatives that could accomplish the agency's purpose and need and reduce environmental effects. Reasonable alternatives are those that are feasible to implement based on environmental, technical, and economic factors.

A reasonable alternative to the proposed project is to take no action and therefore a No Action Alternative will be assessed in the EA. The need for project redesign or a project alternative will be determined during the course of the environmental review.

Scoping

This letter will be available to interested state, local, and federal agencies and members of the public to provide input on issues to be considered in the scope of the environmental review. Agencies are invited to identify issues within their statutory responsibilities that should be considered in the EA. Comments on the issues, scope, and content of the EA should be submitted on or before **December 7, 2012** to:

Laura Margason
Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, CO 80401

laura.margason@go.doe.gov

This letter and the draft EA, when available, will be posted to the Golden Field Office electronic reading room at: http://www.eere.energy.gov/golden/NEPA_DEA.aspx .

Thank you for your interest and participation in the NEPA process.

Sincerely,

Laura Margason

Laura Margason
NEPA Document Manager

Attachments:
Figure 1 – Project Location
Figure 2 – Aerial Location of Project Site
Figure 3 – Site Layout

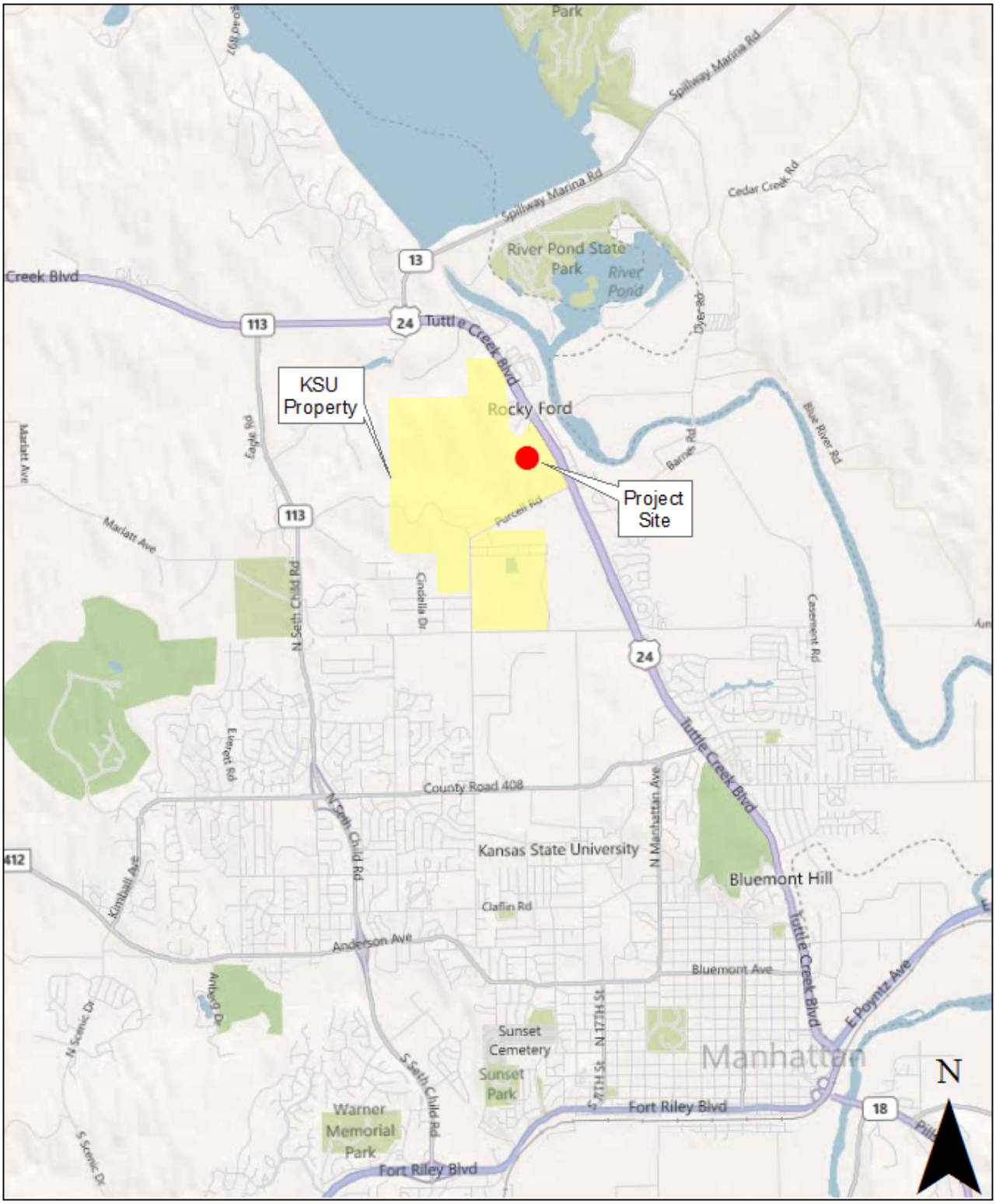

Figure 1 – Project Location

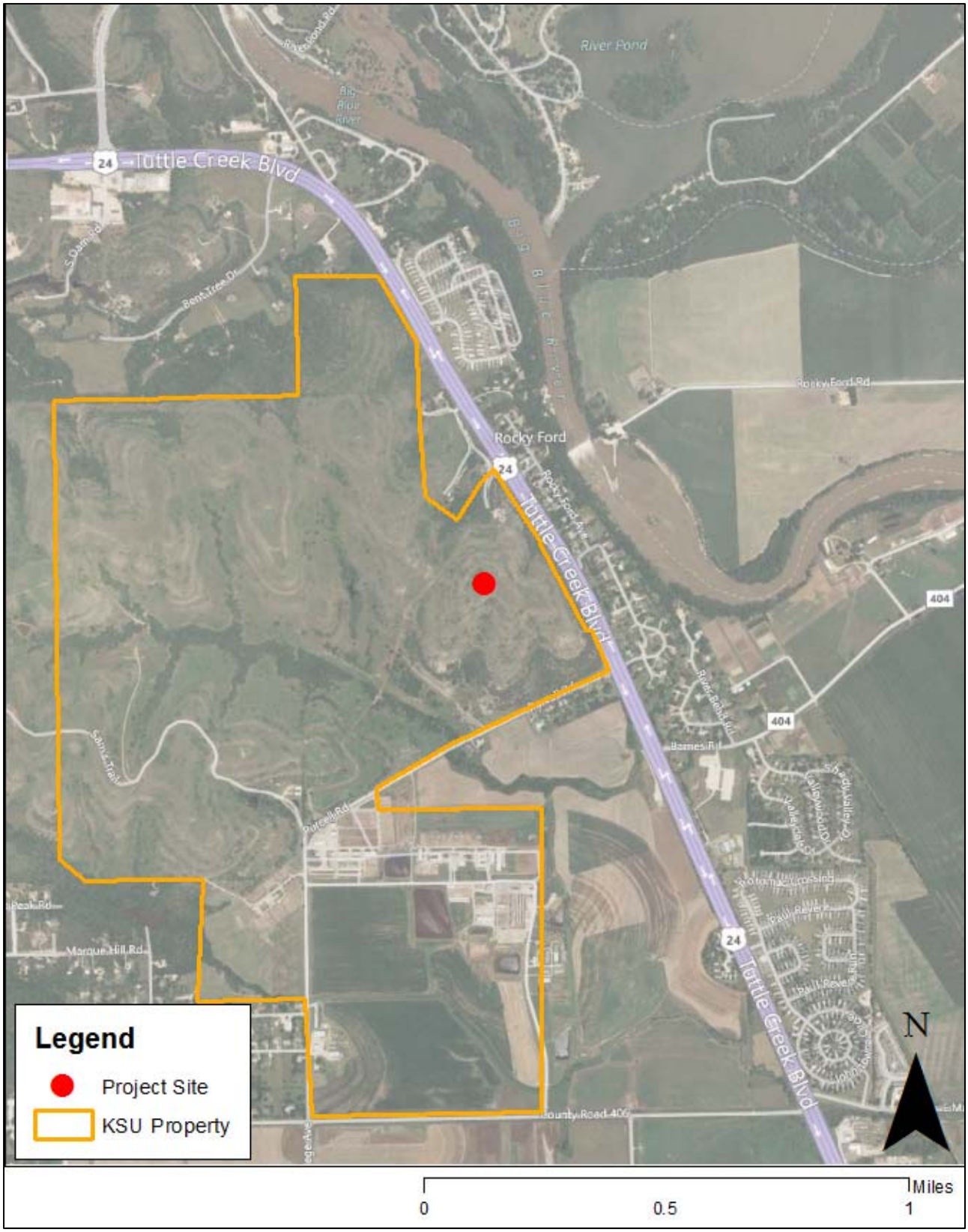

Figure 2 – Aerial Location of Project Site

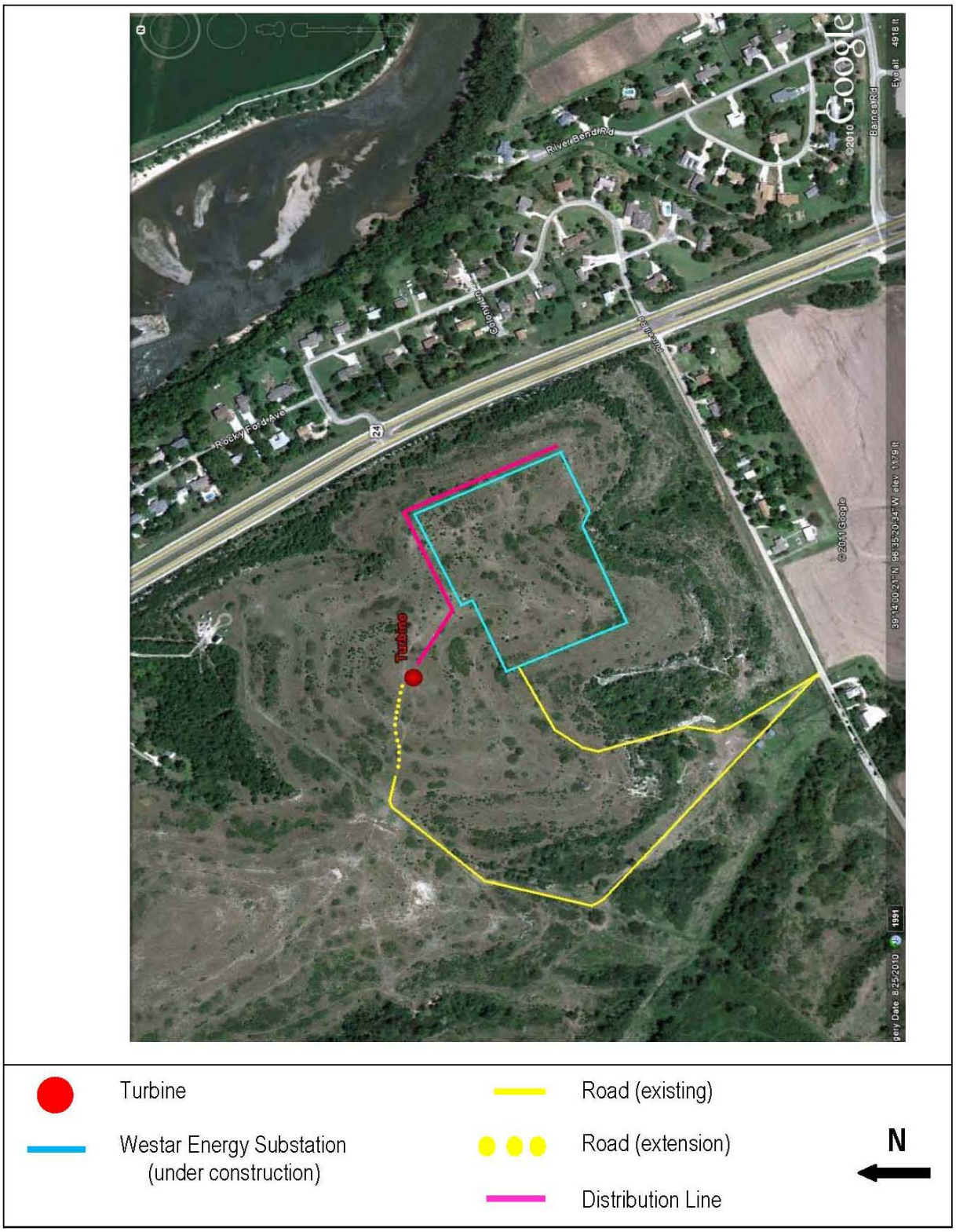

Figure 3 – Site Layout (Approximate)

NOTICE OF SCOPING

The U.S. Department of Energy (DOE) is requesting public input on the scope of environmental issues and alternatives to be addressed in the:

Environmental Assessment
Kansas State Univ. Zond Wind Energy Project
Manhattan, Kansas

The U.S. Department of Energy (DOE) is proposing to authorize the expenditure of federal funding to Kansas State University (KSU) to refurbish, install, operate, and maintain a 750-kilowatt Zond wind turbine on KSU property north of Manhattan, Kansas. An Environmental Assessment (EA) will be prepared by DOE pursuant to the requirements of the National Environmental Policy Act (NEPA). The notice of scoping and description of the proposed project is available for review at the DOE Electronic Public Reading Room at:

http://www.eere.energy.gov/golden/NEPA_DEA.aspx

Public comments on the NEPA process, proposed action and alternatives, and environmental issues will be accepted until **December 7, 2012**. Please send comments to Laura Margason, NEPA Document Manager, 1617 Cole Blvd, Golden, CO 80401 or via email to laura.margason@go.doe.gov.

Public Scoping Mailing List

Joe Cothern
NEPA Coordination Team Leader
901 North Fifth Street
Kansas City, KS 66101

Fort Riley Directorate of Public Works
Herb Abel
Chief, Environmental Division
Sheridan Hall, 407 Pershing Ct
Fort Riley, KS 66442

USDA, NRCS
Kevin Religa
District Conservationist
3705 Miller Parkway, Ste A
Manhattan, KS 66503-7604

U.S. Army Corps of Engineers
Operations Manager
Tuttle Creek Project Office
5020 Tuttle Creek Blvd
Manhattan, KS 66502

USFWS Ecological Services
Mike LeValley
Project Leader
2609 Anderson Ave
Manhattan, KS 66502

FAA, ATO Obstruction Evaluation Service
Brenda Mumper
Wind Turbine Specialist
2300 East Devon Ave
Des Plaines, IL 60018

KS Dept of Health & Environment
John Mitchell
Director, Division of Environment
1000 SW Jackson Str, Ste 400
Topeka, KS 66612-1367

KS State Conservation Commission
Greg Foley
Executive Director
109 SW 9th Str, Ste 500
Topeka, KS 66612

Office of the Governor
Jennifer Knorr
Energy Coordinator
300 SW 10th Ave, Room 222S
Topeka, KS 66612-1590

KS Board of Regents
1000 SW Jackson Str, Ste 520
Topeka, KS 66612-1368

KS Dept of Transportation
W. Clay Adams
District Engineer
121 SW 21st Str
Topeka, KS 66612

KS Dept of Wildlife & Parks
Eric Johnson
Ecologist
512 SE 25th Ave
Pratt, KS 67124

Tuttle Creek State Park
Park Manager
5800 A River Pond Road
Manhattan, KS 66502

KS Corporation Commission
Ryan Freed
Director, State Energy Office
1300 SW Arrowhead Road
Topeka, KS 66604-4027

KS Historical Society, Cultural Resources
Jennie Chinn
State Historic Preservation Office
6425 SW 6th Ave
Topeka, KS 66615-1099

The Nature Conservancy, KS Chapter
Rob Manes
State Director
700 SW Jackson, Ste 804
Topeka, KS 66603

Audubon of Kansas
Ron Klataske
Executive Director
210 Southwind Place
Manhattan, KS 66503

Riley County Planning & Development
Monty Wedel
Planning & Special Projects Director
110 Courthouse Plaza
Manhattan, KS 66502

Riley County Public Works
Leon Hobson
Director
110 Courthouse Plaza
Manhattan, KS 66502

Riley County Commission
Alvan Johnson
Commissioner, District 2
115 North 4th Str
Manhattan, KS 66502

Riley County Parks
Rod Meredith
Asst Public Works Director
2711 Anderson Ave
Manhattan, KS 66502

Regional Airport
Peter Van Kuren
Airport Director
5500 Fort Riley Blvd
Manhattan, KS 66502

Manhattan Public Works Dept
Dale Houdeshell
Director
1101 Poyntz Ave
Manhattan, KS 66502

City of Manhattan
Ron Fehr
City Manager
1101 Poyntz Ave
Manhattan, KS 66502

Adjacent Property Owners – private individuals and businesses (91 total parcels) within one-half mile of the project site

Comment letters received in response to public scoping:

- U.S. Environmental Protection Agency
- U.S. Department of the Army, Fort Riley, Environmental Division, Public Works
- Kansas Department of Wildlife, Parks, and Tourism
- Riley County Planning and Development
- Beverly A. Palmateer

From: Shepard.Larry@epa.gov [mailto:Shepard.Larry@epa.gov]
Sent: Tuesday, November 27, 2012 09:21 AM Mountain Standard Time
To: Margason, Laura
Cc: Cothern.Joe@epamail.epa.gov <Cothern.Joe@epamail.epa.gov>; Robichaud.Jeffery@epamail.epa.gov <Robichaud.Jeffery@epamail.epa.gov>
Subject: EPA Scoping Comments for DOE's Kansas State University Zond Wind Energy Project

Thank you for the opportunity to review the Department of Energy's notice of scoping for the Kansas State University Zond Wind Energy Project (KSU Project) in Manhattan, Kansas. Please consider the following comments as you develop the Environmental Assessment and make a decision on how to proceed under NEPA.

Range of Alternatives

The notice of scoping describes the expected process of including a reasonable range of alternatives as part of the assessment of impacts, including a 'no action' alternative. The proposed alternative lies within property owned by KSU in close proximity to Tuttle Reservoir. In your assessment of a range of alternatives, please give full consideration to alternatives which include multiple locations within the KSU-owned property, other KSU property and other locations outside KSU property lines which could meet the purpose and need for the project. Given the project site's proposed location in close proximity to Tuttle Creek reservoir and the Big Blue River with its associated riparian margins and corridors, the potential for significant impacts to animal species particularly subject to 'strike impacts' could vary greatly among locations. Any decision to limit the detailed assessment of impacts to locations within this specific KSU property must be explicitly explained in the EA. Simply put, the EA should explain why the project could not or should not be located elsewhere.

Comprehensive Assessment of All Effects

In reviewing the scoping notice, it appears that the substation through which the project will connect to the power distribution system is "under construction." The EA should comprehensively assess the impacts associated with the construction and operation of this structure in addition to the wind turbine and other associated project structures. In general, any intent to isolate the impacts associated with substation construction and operation from turbine installation and operation must pass a 'but for' test. If the Westar Energy substation would not be constructed at all, or in the location specified, without installation of the KSU turbine, both project components must be assessed in tandem in this EA.

Thank you for the opportunity to review the DOE public notice for this project. I will serve as your contact for review of the EA. Please note that the location of the EPA Region 7 office has changed. Please modify your mailing list to reflect our new location. If you have any questions regarding these comments, please contact me.

Sincerely,

Larry Shepard
NEPA Team/Interstate Waters, Energy and Invasive Species
US EPA Region 7
11201 Renner Blvd.
Lenexa, Kansas 66219
913-551-7441
Check out EPA's Missouri River Blog: http://blog.epa.gov/bigbluethread/

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT AGENCY
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT RILEY
500 HUEBNER ROAD
FORT RILEY KANSAS 66442-7000

December 17, 2012

Environmental Division, Public Works

Ruth Douglas Miller, Ph.D.
Kansas State University
Manhattan, KS 66506

Dear Dr. Miller:

Thank you for the opportunity to comment regarding the wind turbine you are proposing to construct in the vicinity of Purcell Road and Tuttle Creek Boulevard. I would like to bring to your attention the fact that the proposed turbine would be in the "Line of Sight" of Ft. Riley's Digital Airport Surveillance Radar. The radar system is used by air traffic controllers at both Marshall Army Airfield and the FAA at the Kansas City Air Route Traffic Control Center to provide for the safe, expeditious flow of both military and civil air traffic throughout the region.

While it is certain the turbine you are proposing would be in line of sight of the radar, it is impossible to determine with any degree of confidence beforehand, whether the turbine would be "visible" to (i.e., detected by) the radar. If the turbine is visible to the radar, it will potentially degrade the usefulness of the radar by effectively creating gaps in the radar's coverage. Because of the uncertainty as to whether the turbine would be visible, Fort Riley neither objects to nor endorses the proposed construction. However, Fort Riley encourages the prudent application of practicable siting criteria that would incorporate terrain features to minimize the turbine's visibility to the radar system.

Thank you again for the opportunity to provide comment regarding the proposed turbine construction for your consideration. I am providing a copy of this letter to Mr. Monte Wedel, Riley County Planning and Development Director. If you have any questions or concerns about this comment, please contact me by calling (785) 239-2284 or by e-mail (herbert.abel@us.army.mil).

Sincerely,

Herbert J. Abel
Chief, Environmental Division

Operations Office
512 SE 25th Ave.
Pratt, KS 67124-8174

Kansas
Department of Wildlife, Parks and Tourism

Phone: (620) 672-5911
Fax: 620-672-6020
www.kdwp.state.ks.us

Robin Jennison, Secretary

Sam Brownback, Governor

December 20, 2012

Laura Margason
NEPA Manager
1617 Cole Blvd
Golden, CO 80401

Ref: D5.0302
Riley
ECA: 2011323
Track: 20100504-2

Ref: Environmental Assessment
Kansas State University, Zond
Wind Energy Project

Dear Laura Margason:

We have reviewed the proposed location of a 750 kW wind turbine in Sections 25, Township 09 South, Range 7 East, in Riley County. The project was reviewed for potential impacts on crucial wildlife habitats, current state-listed threatened and endangered species and species in need of conservation, and Kansas Department of Wildlife, Parks, and Tourism managed areas for which this agency has administrative authority.

We note that the plan is to construct a single turbine near a westar substation. Due to the proximity to the substation, we do not anticipate any significant impacts to state threatened or endangered species. We do recommend: to avoid impacts to existing wetlands, minimize the removal of native upland and riparian vegetation, implement standard erosion control BMP's and temporary weed-free seeding/mulching to protect water quality during construction, minimize any / all further instream construction activities particularly during general spawning dates of May 1 through July 31, and the use of native grasses and forbs to permanently revegetate all areas disturbed by construction.

Results of our review indicate there will be no significant impacts to crucial wildlife habitats; therefore, no special mitigation measures are recommended. The project will not impact any public recreational areas, nor could we document any potential impacts to currently listed threatened or endangered species or species in need of conservation. No Department of Wildlife Parks and Tourism permits or special authorizations will be needed if construction is started within one year, and no design changes are made in the project plans. Since the Department's recreational land obligations and the State's species listings periodically change, if construction has not started within one year of this date, or if design changes are made in the project plans, the project sponsor must contact this office to verify continued applicability of this assessment report. For our purposes, we consider construction started when advertisements for bids are distributed.

Thank you for the opportunity to provide these comments and recommendations. If you have any questions or concerns, please contact me at (620)-672-0788 or david.bender@ksoutdoors.com.

Sincerely,

David Bender

David Bender, Ecologist
Ecological Services Section

Pratt Operations Office
512 SE 25th Ave., Pratt, KS 67124-8174
Phone 620-672-5911 Fax 620-672-6020 www.ksoutdoors.com

From: Bob Isaac [mailto:risaac@rileycountyks.gov]
Sent: Tuesday, November 27, 2012 3:03 PM
To: Margason, Laura
Cc: Monty Wedel; Clancy Holeman; Craig Cox
Subject: Notice of Scoping – Kansas State University Wind Turbine

Ms. Margason,

Thank you for the opportunity to respond to the Notice of Scoping – Kansas State University Zond Wind Energy Project. By the information provided in the notice, we understand that the U.S. Department of Energy (DOE) is proposing to provide Congressionally Directed Federal Funding to Kansas State University (KSU) to refurbish, install, operate and maintain a 750-kilowatt (kW) wind turbine on KSU owned property, located north of Purcell Road and west of U.S. Highway 24 (Tuttle Creek Boulevard). We also understand that in order to be compliant with certain requirements of NEPA, an environmental assessment must be completed by DOA to evaluate potential impacts that may result from the project.

CONCERNS:

1. The Notice of Scoping points out that the proposed project site is outside the city limits of Manhattan. This means that the proposed project site is within Riley County's jurisdiction and is subject to all applicable rules and regulations. As of now, officials from KSU have not contacted this office regarding the proposed project. Although the project site may be "owned" by KSU, it is zoned "AG" (Agricultural District), not "U" (University); thus, KSU will be responsible for obtaining zoning approval, as per the minimum requirements of Section 22 – SPECIAL USES of the Riley County Zoning Regulations (http://www.rileycountyks.gov/DocumentCenter/Index/43), prior to moving forward with the project. We strongly advise that those involved in the project, including KSU, are made aware of the potential impact the process for obtaining a "Special Use Permit" may have on the project. It is strongly recommended that Riley County Planning & Development be contacted as soon as possible in the early stages of the project's development; and

2. One of the most significant local resources that could potentially be affected by the project that isn't listed in the general description is Fort Riley. We strongly advise that officials at Fort Riley be contacted as part this analysis for their feedback on the project. The person who may be able to help in this regard is Herb Abel, Fort Riley Directorate of Public Works Chief, Environmental Division. He can be reached by calling (785) 239-2284 or email herbert.able@us.army.mil.

Thanks once again for the opportunity to provide feedback and concerns regarding the proposed project. If you have questions or need additional information, please contact me.

Sincerely,
Bob Isaac

Planner
Riley County Planning & Development
(785) 537-6332
risaac@rileycountyks.gov

Manhattan, KS
Nov. 14, 2012

NEPA Document Manager
1617 Cole Blvd.
Golden CO 80401
Re: Notice of Scoping

Dear Ms Margason:

I am writing to you because "we don't do E-mail." We received your "Notice of scoping" post-marked 11/6/2012. My husband and I have questions that I hope someone will answer for us.

You refer to one 750-Kilowatt Zond wind turbine. My first question is: Is this the only "one" or will there be — eventually — 2, 3, 5, or dozens? What is the prop. blade length, tower height, etc? Where would it be placed? What kind of impact would it (or they) have on the surrounding area? What about noise, appearance? How long ~~would~~ this maintenance last? Would it ever be dumped on the university to maintain? What does it cost to operate one of this size in a year's time, after 10 years, and after 20 years? What is the pay back? Is there a wind turbine of this size in the area that we can see for ourselves?

We look forward to receiving your answers.

Sincerely,

Beverly A Palmateer
3908 Rocky Ford Ave.
Manhattan KS 66502

copy to Riley County Comm.

Appendix B:
Agency Consultation

Endangered Species Act, Section 7 Consultation
with
U.S. Fish and Wildlife Service

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393
September 7, 2012

Mike LeValley
U.S. Fish and Wildlife Service
2609 Anderson Avenue
Manhattan, Kansas 66502

Re: Request for Species List, Kansas State University Zond Wind Energy Project

Dear Mr. LeValley,

The U.S. Department of Energy (DOE) is proposing to provide Congressionally Directed Federal Funding to Kansas State University (KSU) to refurbish, install, operate, and maintain a 750-kilowatt (kW) wind turbine on KSU property approximately 3 miles north of the main campus in Manhattan. DOE is preparing an Environmental Assessment for the proposed project in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021).

A Zond Z-50 model wind turbine was donated to KSU to be used for education, research, and energy production. The Zond tower is 164 feet (50 meters) tall and each blade is 82 feet (25 meters) long for a total blade height of 246 feet (75 meters). A concrete pad approximately 40 feet square by 8 feet deep would be constructed for the turbine foundation. A transformer would be installed near the base of the turbine and an electrical distribution line would connect the transformer to the electrical grid at the nearby Westar Energy substation that was recently constructed. The distribution line would be installed underground for the entire distance between the substation and turbine, or would be on above ground poles for most of the distance and then placed underground as it approached the transformer. The length of the distribution line would be approximately 1,000 feet. An existing gravel road would be reinforced with additional gravel and be lengthened by approximately 200 feet to access the proposed turbine site. After installation, the KSU Department of Electrical and Computer Engineering would conduct different research projects with University students. When not used for research and education, the turbine would generate electricity that would be relayed to the grid and Westar Energy would directly reduce KSU's electricity consumption costs by the amount generated.

The proposed location for the wind turbine is shown on Figure 1. The turbine would be located outside the city limits of Manhattan in the southeast quarter of Section 25, Township 9 North, Range 7 East of the 6th

Principle Meridian in Riley County. Figure 2 indicates the proposed site is located on the knoll north of Purcell Road and west of U.S. Highway 24 (Tuttle Creek Boulevard). The approximate layout of the site is shown on an aerial photo in Figure 3.

Based on a review of available information for listed species, the interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and Topeka shiner (*Notropis Topeka*) are known to occur within Riley County. Although the proposed project location does not likely provide suitable habitat for the tern or plover and is distant from shiner habitat, DOE requests information on these listed species, other species of concern, and any designated critical habitat that may be present in the project area. Once project details and research is complete, DOE will initiate consultation per Section 7 of the Endangered Species Act with your office.

Please contact me at 720-356-1322 or at laura.margason@go.doe.gov with any questions. Thank you for your assistance.

Sincerely,

Laura Margason

Laura Margason
NEPA Specialist

Attachments:
- Figure 1 – Project Location
- Figure 2 – Aerial Location of Project Site
- Figure 3 – Site Layout

NOTE: Attachments are included in Appendix A, Notice of Scoping, Figures 1-3.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

September 24, 2012

Laura Margason
NEPA Specialist
Department of Energy
1617 Cole Boulevard
Golden, CO 80401

RE: KSU Zond Wind Energy Project; Manhattan, KS 64411-2012-CPA-1056

Dear Ms. Margason;

This is in reply to your September 11, 2012 letter requesting Fish and Wildlife Service review and comment on a proposal by Kansas State University to install a Zond Z-50 model wind turbine north of the city limits of Manhattan. The tower is to be 164 feet tall, with a total blade height of 246 feet. The following comments are provided for your consideration.

I concur with your preliminary determination that the installation and use of this tower will not adversely affect any federally-listed threatened or endangered species. There is no need for further consultation pursuant to section 7 of the Endangered Species Act.

It is unclear whether this tower will be free-standing or supported by guy wires. Deployment of guy wires, along with aviation warning lights, creates a risk to night-migrating birds protected by the Migratory Bird Treaty Act. I recommend the following Service tower guidelines be utilized in the installation and operation of this project.

1. If taller (>199 feet) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights.

2. No more guy wires than are necessary to ensure the safety and stability of a tower should be employed, and all towers which require guy wires should utilize daytime visual markers to prevent collisions by diurnally moving species such as waterfowl and raptors. See www.eei.org/resources/pubcat/enviro for guidance on markers.

3. Towers and appendant facilities should be sited, designed and constructed to avoid or minimize habitat loss within and adjacent to the tower "footprint". However, a larger tower footprint may be preferable to the use of guy wires in construction. Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above-ground obstacles to birds in flight.

4. Security lighting for on the ground facilities and equipment should be down-shielded to keep light within the boundaries of the tower site.

If you have additional comments or questions please contact me again at any time. Thank you for this opportunity to review and provide comments on the proposal.

Sincerely,

Daniel W. Mulhern
Acting Field Supervisor

cc: KDWPT, Pratt, KS (Ecological Services)

2

National Historic Preservation Act, Section 106 Consultation

with

Kansas Historical Society (State Historic Preservation Office)

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

November 1, 2012

Jennie Chinn
Executive Director and State Historic Preservation Officer
Kansas Historical Society
6425 SW 6th Avenue
Topeka, Kansas 66615

RE: **Kansas State University Zond Wind Energy Project (KSR&C No. 10-03-039)**

Dear Ms. Chinn:

The U.S. Department of Energy (DOE) is proposing to provide Congressionally Directed Federal Funding to Kansas State University (KSU) to refurbish, install, operate, and maintain a 750-kilowatt wind turbine on KSU property approximately 3 miles north of the main campus in Manhattan. Pursuant to the requirements of Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's implementing regulations (36 CFR Parts 800-899), DOE respectfully requests concurrence with the determination that installation and operation of the wind turbine would not affect historic properties.

The project location was reviewed by Lauren W. Ritterbush with the Department of Sociology, Anthropology, and Social Work at KSU and a report entitled *Second Archaeological Reconnaissance (2011) for Proposed KSU Wind Turbine, Manhattan, Riley County, Kansas* was prepared by Dr. Ritterbush and submitted to your office. A recommendation was made to construct a temporary fence around a possible prehistoric burial site (14RY673) to prevent accidental damage during construction activities. Your office responded by letter dated November 4, 2011 providing concurrence that with avoidance of the site, the proposed project will have no effect on historic properties.DOE has received documentation that KSU has completed set up of a temporary fence around the site.

DOE's proposed action of providing funding requires KSU to commit to specific measures to avoid or minimize adverse impacts to resources. One such measure would include regular maintenance and oversight of the temporary fence to avoid the possible burial site during installation of the turbine. Other measures would be confirmed upon completion of the environmental assessment but would likely include controlling runoff

from the turbine location to prevent possible erosion around the burial site, and developing a cultural awareness program for students, faculty, and vendors that may have access to the turbine for operation and maintenance. With KSU's commitment to implementing these measures, the proposed undertaking would have no effect on historic properties.

Additionally, DOE has also initiated consultation with the tribal governments with interests in the project area and will notify your office if any concerns are raised by this consultation.

Please contact me at 720-356-1322 or at laura.margason@go.doe.gov with any questions. Thank you for your assistance.

Sincerely,

Laura Margason

Laura Margason
NEPA Document Manager

Attachments: Figures 1-3

NOTE: Attachments are included in Appendix A, Notice of Scoping, Figures 1-3.

KSR&C No. 10-03-039

6425 SW 6th Avenue
Topeka, KS 66615

Kansas

phone: 785-272-8681
fax: 785-272-8682
cultural_resources@kshs.org

Kansas Historical Society

Sam Brownback, Governor
Jennie Chinn, Executive Director

November 7, 2012

Laura Margason
NEPA Document Manager
Department of Energy
1617 Cole Boulevard
Golden, CO 80401-3393

RE: Zond Wind Energy Project
Kansas State University
Riley County

Dear Ms. Margason:

In accordance with 36 CFR 800, the Kansas State Historic Preservation Office has reviewed your letter, dated November 1, 2012, describing the above-referenced project. As you noted, we have been reviewing this project for some time. We have already (in a letter dated November 4, 2011) found the archeological survey conducted by Dr. Lauren Ritterbush to be acceptable, and we have agreed that the possible prehistoric burial site (14RY673) should be avoided. We note that measures to avoid impacts to the site during turbine construction include temporary fencing (already installed) along with erosion control measures and the development of a cultural awareness program for those who may have access to the turbine area. With those stipulations, we concur with the determination that proposed project will have no effect on historic properties as defined in 36 CFR 800. Our office continues to have no objection to implementation of the Zond Wind Energy Project.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston at 785-272-8681 (ext. 214) or Kim Gant at 785-272-8681 ext. 225. Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
Executive Director and
State Historic Preservation Officer

Timothy Weston for

Patrick Zollner
Deputy State Historic Preservation Officer

National Historic Preservation Act, Section 106 Consultation

with

Osage Nation of Oklahoma

Kaw Nation

Delaware Nation

Citizen Potawatomi Nation

NOTE: The following letter was sent separately to each Tribe; the attachments are included in Appendix A, Notice of Scoping, Figures 1-3.

No response was received from any of the four Tribes.

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393
November 2, 2012

Dr. Andrea Hunter
THPO/Director of Historic Preservation
Osage Nation of Oklahoma
627 Grandview, P.O. Box 779
Pawhuska, OK 74056

SUBJECT: Kansas State University Zond Wind Energy Project, Riley County, Kansas

Dear Dr. Hunter:

The U.S. Department of Energy (DOE) is proposing to provide Congressionally Directed Federal Funding to Kansas State University (KSU) to refurbish, install, operate, and maintain a 750-kilowatt wind turbine on KSU property approximately 3 miles north of the main campus in Manhattan, Kansas. DOE is preparing an Environmental Assessment (EA) for the proposed project in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021).

A Zond Z-50 model wind turbine was donated to KSU to be used for education, research, and energy production. The Zond tower is 164 feet (50 meters) tall and each blade is 82 feet (25 meters) long for a total blade height of 246 feet (75 meters). A concrete pad approximately 40 feet square by 8 feet deep would be constructed for the turbine foundation. A transformer would be installed near the base of the turbine and an electrical distribution line would connect the transformer to the electrical grid at the nearby Westar Energy substation that was recently constructed. The distribution line would be installed underground for the entire distance between the substation and turbine, or would be on above ground poles for most of the distance and then placed underground as it approached the transformer. The length of the distribution line would be approximately 1,000 feet. An existing gravel road would be reinforced with additional gravel and be lengthened by approximately 200 feet to access the proposed site to install the turbine. After installation, the KSU Department of Electrical and Computer

Engineering would conduct different research projects with University students. When not used for research and education, the turbine would generate electricity that would be relayed to the grid and Westar Energy would directly reduce KSU's electricity consumption costs by the amount generated.

The proposed location for the wind turbine is shown on Figure 1. The turbine would be located outside the city limits of Manhattan in the southeast quarter of Section 25, Township 9 North, Range 7 East of the 6th Principle Meridian in Riley County. Figure 2 indicates the proposed site is located on the knoll north of Purcell Road and west of U.S. Highway 24 (Tuttle Creek Boulevard). The approximate layout of the site is shown on an aerial photo in Figure 3.

The project location was reviewed by Lauren W. Ritterbush, Ph.D and Associate Professor of Archaeology with the Department of Sociology, Anthropology, and Social Work at KSU and a report entitled *Second Archaeological Reconnaissance (2011) for Proposed KSU Wind Turbine, Manhattan, Riley County, Kansas* was prepared by Dr. Ritterbush. A possible prehistoric burial site (14RY673) was located in the project area and KSU constructed a fence around the site to prevent accidental damage during construction activities. The Kansas State Historic Preservation Officer reviewed the report and concluded by letter dated November 4, 2011 that with avoidance of the site, the proposed project will have no effect on historic properties.

To assist with the preparation of the EA and to meet obligations under Section 106 of the National Historic Preservation Act (36 CFR Part 800) and the Native American Graves Protection and Repatriation Act of 1990, DOE is initiating consultation and requesting information on properties of traditional or cultural significance within the vicinity of the proposed project. We are also requesting comments or concerns you may have on the potential effects this proposed project may have to those properties.

Please provide any information and direct any questions within 30 days of receipt of this letter to:

Laura Margason
U.S. Department of Energy, Golden Field Office
1617 Cole Boulevard
Golden, CO 80401

laura.margason@go.doe.gov

DOE will send you notice when the Draft EA when it is released for public comment. Thank you in advance for your assistance.

Sincerely,

Laura Margason

Laura Margason
NEPA Document Manager

Attachments: Figures 1-3

Federal Aviation Administration

Obstruction Evaluation – No Hazard Determination

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-WTE-22-OE

Issued Date: 02/04/2013

Don Gruenbacher
Kansas State University
Dept Electrical and Computer Engineering
2061 Rathbone Hall, KSU
Manhattan, KS 66506

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine KSU Zond 50
Location:	Manhattan, KS
Latitude:	39-14-03.90N NAD 83
Longitude:	96-35-28.46W
Heights:	1215 feet site elevation (SE) 246 feet above ground level (AGL) 1461 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 08/04/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

Page 1 of 2

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (816) 329-2524. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-WTE-22-OE.

Signature Control No: 180677151-182464375 (DNE -WT)
Brenda Mumper
Specialist

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Natural Resources Conservation Service

Farmland Conversion Impact Rating

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
3705 Miller Parkway, Suite B
Manhattan, Kansas 66503-7604

Phone: (785) 776-7582
FAX: (785) 539-7983
www.ks.nrcs.usda.gov

April 4, 2013

Mary B. Peters
MBP Consulting, LLC
7772 High Chaparral Street
Las Vegas, NV 89113

Re: Kansas State University Wind Turbine Project, Manhattan, Kansas.

Dear Ms. Peters:

The Farmland Protection Policy Act (FPPA) applies to projects where federal technical or financial assistance is being requested. FPPA provides a process for determining an impact rating when important farmlands are being considered for conversion to non-agricultural uses.

Enclosed is Form AD-1006, Farmland Conversion Impact Rating, with the Natural Resources Conservation Service's (NRCS) parts completed, as requested.

Sincerely,

TROY J. MUNSCH
Assistant State Conservationist (FO)

Attachment

ec:
Susan M. McBride, Soil Conservationist, NRCS, Salina, Kansas
Kevin C. Religa, District Conservationist, NRCS, Manhattan, Kansas
Ed L. Erickson, Supervisory District Conservationist, NRCS, Westmoreland, Kansas
Alan R. Boerger, Resource Conservationist, NRCS, Manhattan, Kansas

Helping People Help the Land

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 04/03/2013	
Name of Project KSU Zond Wind Energy Project		Federal Agency Involved Department of Energy	
Proposed Land Use Wind Turbine		County and State Riley, Kansas	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 4/3/2013	Person Completing Form: Alan R. Boerger
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated 1,600	Average Farm Size 508 Acres
Major Crop(s) Corn/Soybeans	Farmable Land In Govt. Jurisdiction Acres: 96,916 % 24	Amount of Farmland As Defined in FPPA Acres: 77,700 % 20	
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS 4/4/2013	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0.25			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	0.25			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0			
B. Total Acres Statewide Important or Local Important Farmland	0.25			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	< 1			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	93			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	28			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	10			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	20			
4. Protection Provided By State and Local Government	(20)	20			
5. Distance From Urban Built-up Area	(15)	5			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	20			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	90	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	28	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	90	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	118	0	0	0

Site Selected: A	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

Location for the wind turbine meets the siting criteria of KSU property, elevation to maximize wind potential, available power source, accessibility, and minimal environmental and physical constraints.

Name of Federal agency representative completing this form: MARY PETERS — Date: 4/3/13

(See Instructions on reverse side)

Form AD-1006 (03-02)