SOUTH TABLE WIND PROJECT
ENVIRONMENTAL ASSESSMENT FOR
PRE-APPROVAL REVIEW

DOE/EA 1909

U.S. Department of Energy
Western Area Power Administration
Corporate Services Office
Lakewood, Colorado

March 2012

SOUTH TABLE WIND PROJECT
ENVIRONMENTAL ASSESSMENT FOR
PRE-APPROVAL REVIEW

DOE/EA 1909

Prepared for

U.S. Department of Energy
Western Area Power Administration
Corporate Services Office
Lakewood, Colorado

March 2012

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF ABBREVIATIONS AND ACRONYMS

ABPP	Avian and Bat Protection Plan
ATV	All terrain vehicle
AWEA	American Wind Energy Association
BCI	Bat Conservation International, Inc.
BLM	Bureau of Land Management
BSMU	Banner South Management Unit
CAAQS	Colorado Ambient Air Quality Standards
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
C.F.R.	*Code of Federal Regulations*
Corps	U.S. Army of Corps of Engineers
CRP	Conservation Reserve Program
dBA	A-weighted decibel
DOE	U.S. Department of Energy
EA	Environmental assessment
EIS	Environmental impact statement
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
FPA	*Federal Power Act*
FR	*Federal Register*
GEI	Generation Energy, Inc.
GIS	Geographic Information System
HF	High frequency
GAO	General Accounting Office
GHG	Green house gases
I-80	Interstate 80
kHz	Kilohertz
kV	Kilovolt
LGIA	Large Generator Interconnection Agreement
LGIP	Large Generator Interconnection Procedures
LF	Low frequency
MF	Mid-frequency
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEAAQS	Nebraska Ambient Air Quality Standards
NEPA	*National Environmental Policy Act of 1969*
NDEQ	Nebraska Department of Environmental Quality
NG&PC	Nebraska Game and Parks Commission
NGS	Nebraska Geological Survey
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service

LIST OF ABBREVIATIONS AND ACRONYMS (Continued)

NRHP	National Register of Historical Places
NWCC	National Wind Coordinating Committee
NWI	National Wetland Inventory
O&M	Operation and maintenance
PEIS	Programmatic environmental impact statement
PEMA	Palustrine Emergent, temporarily flooded
PEMAh	Palustrine Emergent, temporarily flooded, diked, impoundment
PEMC	Palustrine Emergent, seasonally flooded
PSB	Passerines and small birds
PSD	Prevention of significant deterioration
PUBFx	Palustrine unconsolidated bank, semipermanently flooded, excavated
PUSAh	Palustrine unconsolidated shore, temporarily flooded, dike, impoundment
RLB	Raptors and large birds
RMBO	Rocky Mountain Bird Observatory
ROW	Right-of-way
RSA	Rotor-swept area
SCADA	Supervisory control and data acquisition
SCWP	Spring Canyon Wind Project
SGIA	Small Generator Interconnection Agreement
SGIP	Small Generator Interconnection Procedures
SHPO	State Historic Preservation Office
SPCCP	Spill Prevention, Control, and Countermeasure Plan
STW	South Table Wind, LLC
STWF	South Table Wind Farm Project
SWPPP	Storm Water Pollution Prevention Plan
Tariff	Open Access Transmission Service Tariff
TRC	TRC Environmental Corporation
TEPC	Threatened, endangered, proposed, and candidate
T&E	Threatened and endangered
Uinta Paleo	Uinta Paleontological Associates, Inc.
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	Vehicle-mile traveled
Western	Western Area Power Administration
WQD	Water Quality Division
WRCC	Western Regional Climate Center
WUS	Waters of the U.S.

This page is intentionally left blank.

1.0 INTRODUCTION

1.1 BACKGROUND

Generation Energy, Inc. (GEI) submitted an interconnection request to the Western Area Power Administration (Western) for a connection of its proposed South Table Wind Farm (STWF) Project to Western's existing Sidney-Archer 115-kilovolt (kV) transmission line. Under a joint venture agreement, GEI and Bechtel Development Company have formed South Table Wind, LLC (STW), and STW will be the developer, contractor, and operator of the STWF Project. The project is located in the panhandle of southwestern Nebraska in Kimball County approximately 4 mi south of Interstate 80 (I-80) and approximately 6 mi southeast of Kimball, Nebraska. The STWF Project would consist of a maximum of 40 1.5-megawatt (MW) or 24 2.5-MW (or a similar combination thereof) wind electric power generation turbines sited within an approximately 11,287-acre project area (Figure 1.1). The project area is located in the western high plains ecosystem, which is characterized by a semi-arid climate. Topography is rolling cropland, fallow fields (i.e., Conservation Reserve Program [CRP]), rangeland composed of a shortgrass prairie species over sandy loamy soils. The area is drained by several unnamed intermittent drainages with Sand Draw as the primary drainage that crosses the northern portion of the project area.

1.2 NATIONAL ENVIRONMENTAL POLICY ACT

The *National Environmental Policy Act of 1969* (NEPA) and Council on Environmental Quality (CEQ) implementing regulations (40 *Code of Federal Regulations* [C.F.R.] 1500-1508) establish procedures that ensure environmental information is available to decision makers, regulatory agencies, and the public before implementation of federal actions. Western is the lead federal agency for compliance with NEPA. The Department of Energy (DOE) NEPA Implementing Procedures (10 C.F.R. 1021) require that an environmental assessment (EA) be prepared for contracts for the addition of new generation resources, such as the proposed STWF Project (DOE 2004).

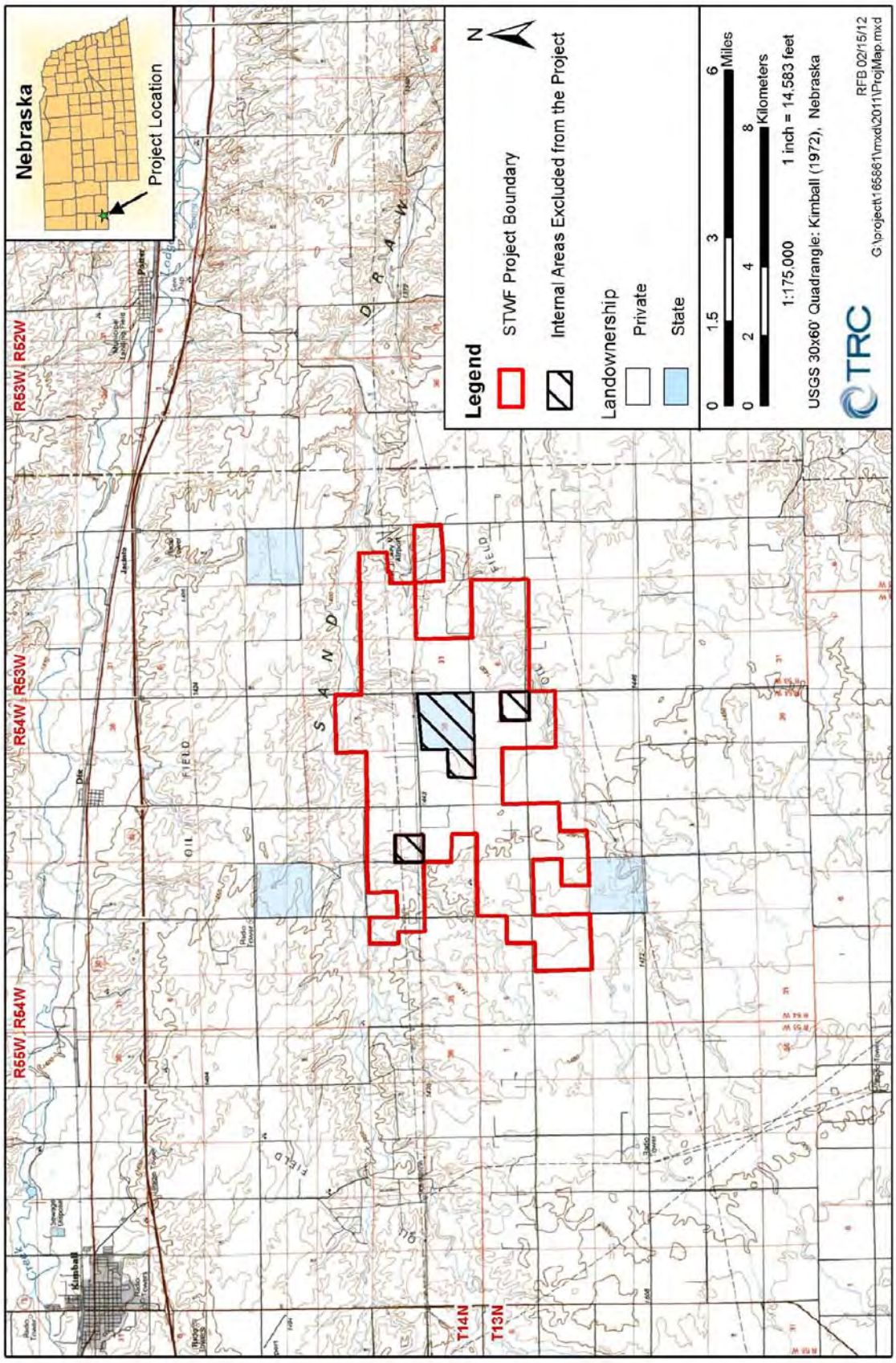


Figure 1.1 Location Map of the South Table Wind Farm Project.

This EA identifies and analyzes the effects of Western's Proposed Action and GEI's Proposed Action and alternatives of the STWF Project on the human and natural environment and suggests mitigation strategies for potential adverse impacts. The EA is an informational document, written in plain language, to inform the public and decision makers of the potential environmental effects of the Proposed Actions. Western will use this EA to decide whether to prepare an Environmental Impact Statement (EIS) or to issue a Finding of No Significant Impact (FONSI). Scientific studies and other verified background information used to support this EA are incorporated by reference and summarized in the document.

1.3 PURPOSE AND NEED

1.3.1 Western's Purpose and Need

GEI requests to interconnect its proposed Project with Western's existing Sidney-Archer 115-kilovolt (kV) transmission line. Western's purpose and need is to approve or deny the interconnection request in accordance with its Open Access Transmission Service Tariff (Tariff) and the *Federal Power Act*, as amended (FPA).

Under the Tariff, Western offers capacity on its transmission system to deliver electricity when capacity is available. The Tariff also contains terms for processing requests for the interconnection of generation facilities to Western's transmission system. The Tariff substantially conforms to Federal Energy Regulatory Commission (FERC) final orders that provide for non-discriminatory transmission system access. Western originally filed its Tariff with FERC on December 31, 1997, pursuant to FERC Order Nos. 888 and 889. Responding to FERC Order No. 2003, Western submitted revisions regarding certain Tariff terms and included Large Generator Interconnection Procedures (LGIP) and a Large Generator Interconnection Agreement (LGIA) in January 2005. In response to FERC Order No. 2006, Western submitted additional term revisions and incorporated Small Generator Interconnection Procedures (SGIP) and a Small Generator Interconnection Agreement (SGIA) in March 2007. In September 2009,

Western submitted yet another set of revisions to address FERC Order No. 890 requirements along with revisions to existing terms.

In reviewing interconnection requests, Western must ensure that existing reliability and service is not degraded. Western's LGIP provides for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies also identify system upgrades or additions necessary to accommodate the proposed project and address whether the upgrades/additions are within the project scope.

Authority:

Western must consider interconnection requests to its transmission system in accordance with its Tariff and the FPA. Western satisfies FPA requirements to provide transmission service on a non-discriminatory basis through compliance with its Tariff. Under the FPA, FERC has the authority to order Western to allow an interconnection and to require Western to provide transmission service at rates it charges itself and under terms and conditions comparable to those it provides itself.

1.3.2 STW's Purpose and Need

The primary purpose of the STWF Project is to provide wind-generated electricity from a site in Nebraska to further the objectives of the President's National Energy Policy to diversify energy sources by making greater use of nonhydroelectric renewable sources such as wind power (National Energy Policy Development Group 2001) and to meet customer demand for competitively priced energy from renewable resources.

1.4 PUBLIC SCOPING

Public and regulatory agency involvement is critical in analyzing the proposed STWF Project. During the early stages of project planning, STW notified stakeholders of the project and solicited information on their concerns. Every landowner within the project area was personally contacted about the project, and STW has entered into Option Agreements for easements with landowners in the project area for the purposes of construction and operation of the wind turbines, as well as the interconnection transmission line.

The STWF project team and Western met in Lakewood, Colorado, on May 20, 2011, to discuss the tentative schedule and NEPA process for the project.

Conference calls with the STWF project team, Western, the Nebraska Department of Game and Parks (NG&PC), and U.S. Fish and Wildlife Service (USFWS), were conducted on May 26 and July 14, 2011, to discuss specific wildlife issues for the development of the site. The issues identified during the public scoping and agency consultation include:

- impacts to Nebraska state-sensitive species such as the swift fox and mountain plover;
- impacts to avian and bat species; and
- impacts to golden eagles.

Consultation with Native American tribes occurred through written correspondence to the Eastern Shoshone Tribe; Northern Arapaho Tribe; Ute Indian Tribe; Northern Cheyenne Tribe; Oglala Lakota Nation; Rosebud Sioux Tribe; and the Crow Nation.

On June 3, 2011, Western and STW sent notices to the public and public agencies in the area announcing Western's decision to prepare an EA and to request comments on Western's proposal to approve the interconnection request on the STWF Project. The notice was sent to affected landowners, adjacent landowners, state and local government agencies, and officials (refer to Appendix A).

In addition, STW held a well advertised open house meeting on June 14, 2011, at the Kimball Event Center in Kimball, Nebraska. No comments or issues were identified by the public or public agencies that attended the open house meeting. Persons requesting copies of the EA will receive a copy for review during the public comment period. Representatives from Western and the STWF project team attended the open house to meet with interested members of the public and any agency personnel to discuss the EA activities and the project in general. Approximately 40 people attended the open house.

2.0 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 WESTERN'S PROPOSED ACTION

Western's Proposed Action is to execute an interconnection agreement to connect the wind project to Western's 115-kV Sidney-Archer transmission line and allow the construction, maintenance, and operation of the certain electronic equipment and physical interconnection with Westerns existing 115-kV Sidney-Archer transmission line. The Federal action is limited to the execution of the interconnection agreement and taking possession of certain substation equipment. A separate tap line will not be necessary for the STWF project as the substation will be directly under the Archer-Sidney transmission line. Existing roads would be used to provide access to the physical interconnection location. No surface disturbance or emissions would result under Western's Proposed Action. At this time, Western has determined that there are no mitigation measures necessary for Western's Proposed Action.

2.2 GEI's PROPOSED ACTION

Under GEI's Proposed Action, STW would construct, operate, and maintain a maximum 60-MW wind energy facility located primarily on privately owned land southeast of Kimball in Kimball County, Nebraska (see Figure 1.1). Construction of the project is proposed to begin the second quarter of 2012 and would be completed in the fourth quarter of 2012. STW has obtained leases from the private landowners to construct and operate the wind project on private properties within the project boundary. STW has not determined if any support for utilities (e.g., road, additional lines, etc.) would be required on state-administered lands located within the project boundary. For the purpose of this EA, the project area includes all lands within the project area boundary (see Figure 1.1). The wind project would consist of the installation of up to a maximum of 40 1.5-MW (or 24 2.5-MW) wind turbines (or a combination thereof) and associated facilities (Figure 2.1). "Wind turbine" is the collective term for the equipment that captures the kinetic energy in the wind and converts it to electrical energy. The major components include the blades and hub (collectively called the rotor), the nacelle, and the tower. Inside the nacelle are the gearbox, generator, and various other components critical for

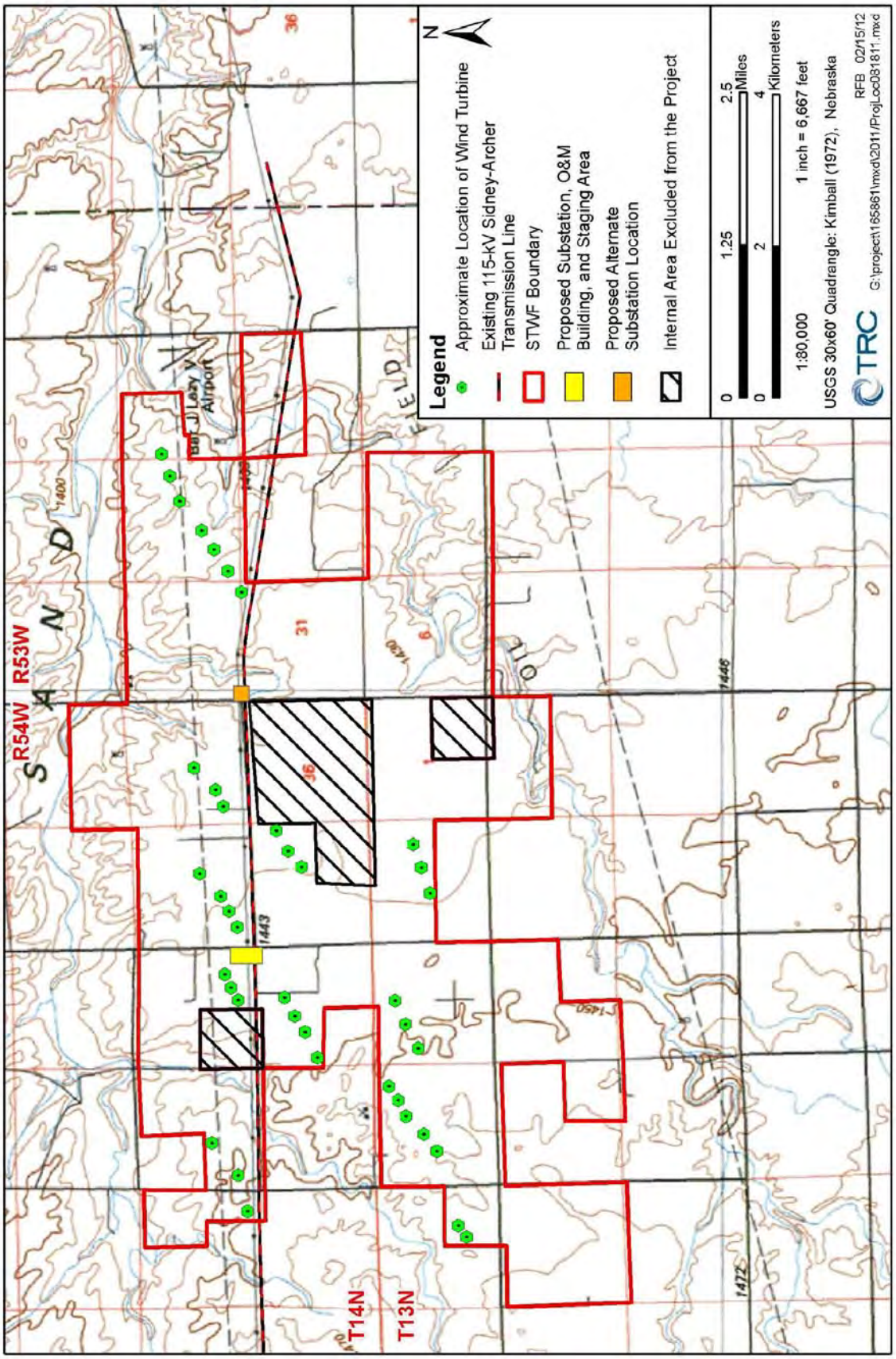


Figure 2.1 Proposed South Table Wind Farm Turbine Array and Associated Facilities.

operation of the wind turbine. Depending on the specific turbine manufacturer, the transformer would be located either in the nacelle or on the ground next to the tower. The wind turbine generators would be supported by approximately 80-m (260-ft) tall tubular towers shown on Figure 2.2. Towers and generators would be white. Transmission collector lines extending from the turbines would be sited within the project area and would extend to a new electric power transmission substation that would be constructed and operated by STW. The project footprint (i.e., the area to be disturbed during construction and throughout the 30-year life of project) would be limited to the areas immediately adjacent to turbines, access roads, and other facilities (Table 2.1). All interconnection facilities, construction, and permanent rights-of-way (ROW) required to site, construct, operate, and decommission the project, including those for any access roads, operations and maintenance (O&M) facilities, and equipment laydown areas, would be located within the project area.

Support facilities would include underground power collection and communication lines, the project substation, site roads, and an O&M building. During the construction phase, a large crane would be used to erect towers and turbines, and it would be walked either along project access roads, along collection line corridors, or cross-country along corridors referred to as crane paths.

Access to the project area would be via a network of existing improved county roads within the project area. Access to wind project facilities, including individual turbines, would be provided by new access roads that would be constructed for the purposes of wind project construction and operation.

During the design phase of this project, STW undertook numerous studies and evaluations to assist in the siting of the project components to minimize potential impacts to the environment and existing man-made facilities in the general project area. Some of these studies and evaluations include a communication interference study and an obstruction evaluation and airport airspace analysis. Results of these studies and evaluations have been used in the siting process for this project.

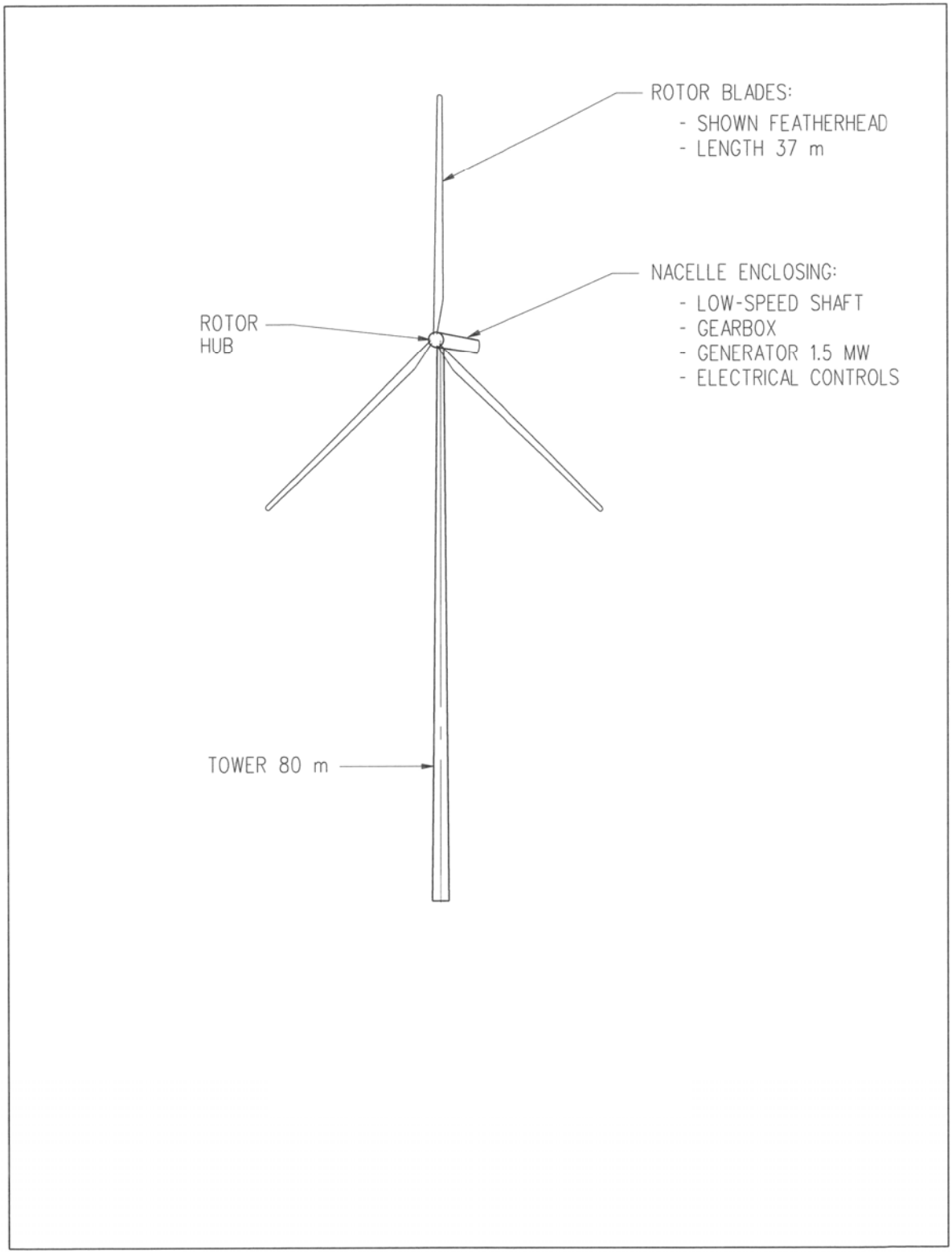


Figure 2.2 Typical Wind Turbine Generator Components.

Table 2.1 Estimated Surface Disturbance Acreage.

Disturbance Type	Initial Disturbance (acres)	Life-of-project Disturbance (acres)
Turbine assembly areas/pads [1]	36.7	1.5
Turbine access roads [2]	53.9	17.2
Turbine collector line corridors and trenches [2]	72.0	0.0
Other access roads (outside turbine corridors) [3]	20.4	20.4
Staging area [4]	5.0	0.0
Crane paths [5]	51.9	0.0
Overhead collector lines [6]	0.0	0.0
Substation and O&M building	20.0	15.0
Total	259.9	54.1

[1] Assumes 40 turbines in a 200 x 200-ft (0.92 acre) assembly area during construction and a 40 x 40-ft (0.038 acre) permanent pad.

[2] Assumes 8.9 mi of turbine access roads, 50-ft wide construction corridor during construction, and reclaimed to 16 ft wide for the life of the project and 11.9 mi of collector line trench corridors 50 ft wide during construction reclaimed to natural conditions for the life of project.

[3] Assumes 7.0 mi of public access road upgrades outside of turbine corridors are 24 ft wide. These represent existing disturbed areas that would receive additional aggregate surfacing.

[4] Assumes one 5.0-acre staging area during construction to be co-located with the substation and O&M building. Area would be restored to natural conditions for the life of the project.

[5] Crane paths would generally run along turbine access roads or collector line construction corridors included above. It is assumed that 12.6 mi of crane path would be required outside of these areas. Crane path disturbance is 34 ft wide during construction and reclaimed to natural conditions for the life of the project.

[6] No overhead collector lines are currently anticipated.

Wind turbines operate autonomously with computer control based on wind speed and direction data. When the anemometer on a wind turbine senses winds within the operational range of the turbine and power sensors find the electrical grid available to accept power, the wind turbine turns itself into the correct wind direction and begins to generate power. It continues to generate electricity until the wind speed is above or below the turbine operational range, the grid is no longer available, or the turbine detects a fault with one of its components. If a fault occurs, the turbine automatically shuts itself down and, depending on the nature of the fault, either waits for the condition to clear itself or signals for maintenance.

Wind turbines are connected through an underground electrical collection system to a project substation, where the power is raised to the voltage of the electrical grid (Figure 2.3). The turbines and towers sit atop large concrete and steel foundations. A permanent O&M building and project substation, as well as temporary construction trailer area and material staging area, would be built on privately owned land (refer to Figure 2.1).

2.2.1 Road and Turbine Pads

The proposed project would use standard construction procedures that are used for other wind project developments in the western U.S. These procedures, with minor modifications to allow for site-specific circumstances, are summarized below.

Construction equipment would include standard dirt-moving equipment, cranes, trucks, and forklifts (Table 2.2).

Prior to the initiation of construction activities, a Storm Water Pollution Prevention Plan (SWPPP), which includes erosion control measures and monitoring requirements, would be prepared and implemented for the project area. The SWPPP would be based on the 1992 U.S. Environmental Protection Agency (EPA) document entitled *Storm Water Management for Construction Activities-Developing Pollution Prevention Plans and Best Management Practices* (EPA 1992). The SWPPP would be developed with the civil design of the project and the *Interim Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*

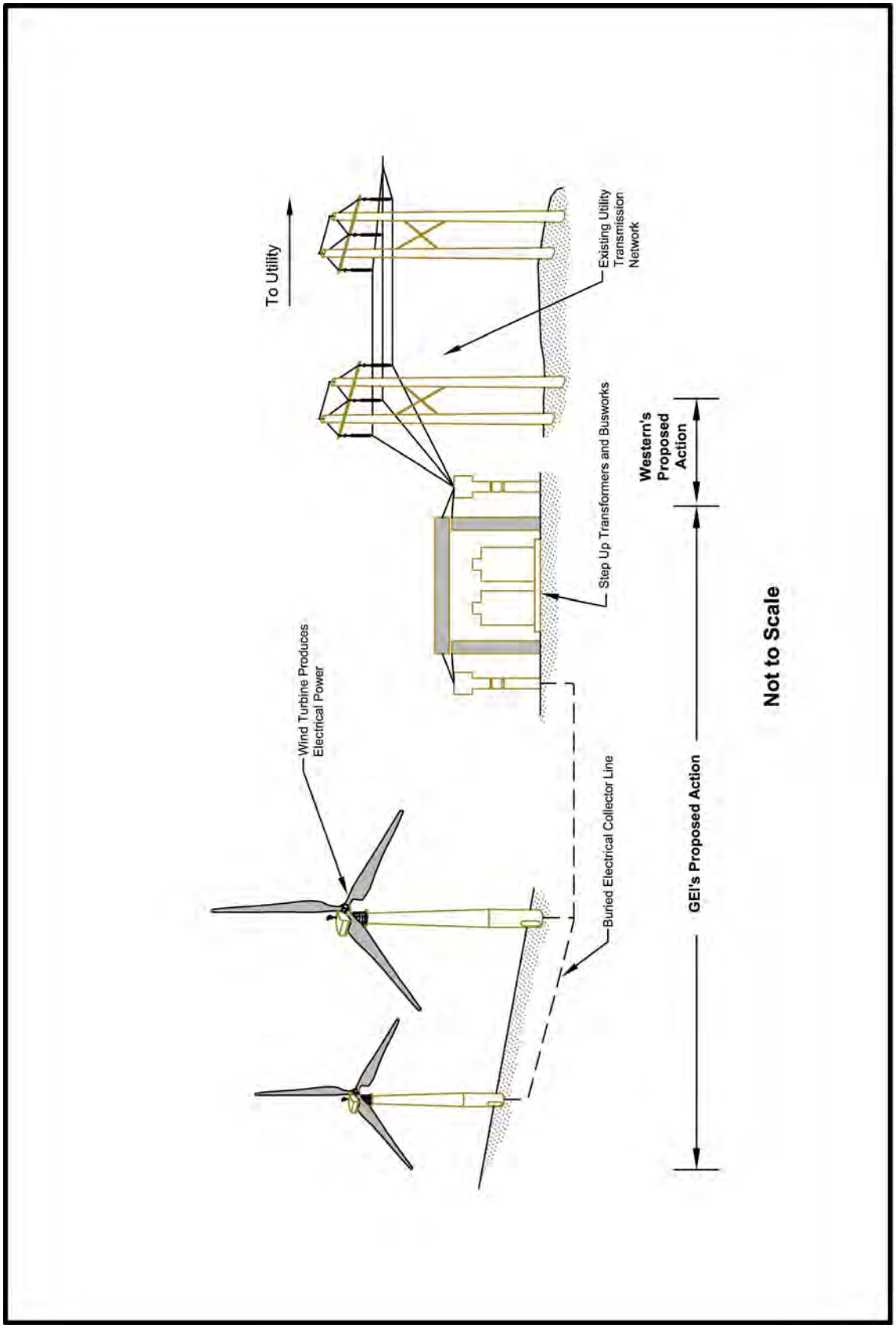


Figure 2.3 Typical Electrical System Components.

Table 2.2 List of Construction Equipment Typically Used for Wind Project Construction.

Equipment	Use
D7 bulldozer	Road and pad construction
Grader	Road and pad construction
Water trucks	Compaction, erosion and dust control
Roller/compactor	Road and pad construction
Backhoe	Digging foundations and trenches for utilities
Trenching machine	Digging trenches for underground utilities
Truck-mounted drill rig	Drilling meteorological tower foundations
Concrete trucks and pumps	Pouring tower and other structure foundations
Cranes	Tower and turbine erection
Dump trucks	Hauling road and pad material
Flatbed trucks	Hauling towers and other equipment
Pickup trucks	General use and hauling minor equipment
Small hydraulic cranes and forklifts	Loading and unloading equipment
Four-wheel drive all-terrain vehicles (ATVs)	Rough grade access and underground cable installation
Rough terrain forklifts	Lifting equipment

(EPA 2007). Once the SWPPP is completed, and prior to construction, STW would apply to the Nebraska Department of Environmental Quality/Water Quality Division (NDEQ/WQD) for coverage under Nebraska's National Pollutant Discharge Elimination System (NPDES) permit for construction activities. Once the SWPPP has been prepared and the permit obtained, STW would implement the SWPPP to minimize soil erosion and reduce water pollution. The SWPPP would also require STW to monitor the project area for erosion or soil instability and take appropriate action should problems become evident.

Access roads would be constructed in accordance with landowner easement agreements. Roads would be located to minimize disturbance and maximize transportation efficiency and to avoid sensitive resources and steep topography. An estimated 8.9 mi of new access roads would be required for the project (see Table 2.1), approximately 6.0 mi of which would be located adjacent to turbine strings.

Roads would be built and maintained to provide safe operating conditions at all times. The minimum full-surfaced travelway width would be 16 ft, and overall surface disturbance is expected to be approximately 50 ft wide (see Table 2.1). Disturbance width may increase in steeper areas due to cuts and fills necessary to construct and stabilize roads on slopes.

Topsoil removed during new road construction would be stockpiled in elongated piles within road easements. Topsoil would be respread on cut-and-fill slopes, and these areas would be reclaimed in accordance with easement agreements.

During construction and O&M of the wind project, traffic would be restricted to public roads and the roads developed for the project. Use of unimproved roads would be restricted to emergency situations. Speed limits would be set to ensure safe and efficient traffic flow. Signs would be placed along the roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information.

Turbine pads would be constructed using standard cut-and-fill procedures, and up to 1,800 yd^3 of concrete would be used in each pad. Concrete would be trucked to the project area from an existing concrete batch plant located outside of the project area.

Turbine towers would be anchor-bolted to the concrete foundations. STW either would use a deep foundation or a shallow foundation depending on the results of site-specific geotechnical testing. Foundation type would depend on site condition and would be excavated using a backhoe or other appropriate excavation equipment. Concrete forms would be used to pour the concrete, and steel anchor bolts would be embedded in the concrete. The concrete would be allowed to cure and backfilled prior to tower erection. Tower foundations are designed to withstand 120-mph winds on the towers.

Turbine tower assembly, laydown areas, and erection would occur within the designated easement. The turbine string corridor would consist of tower assembly areas and pads (200 x 200 ft during construction) and access roads (Figure 2.4). Following construction, portions of the tower assembly areas, pads, and roads and all trenched areas would be backfilled,

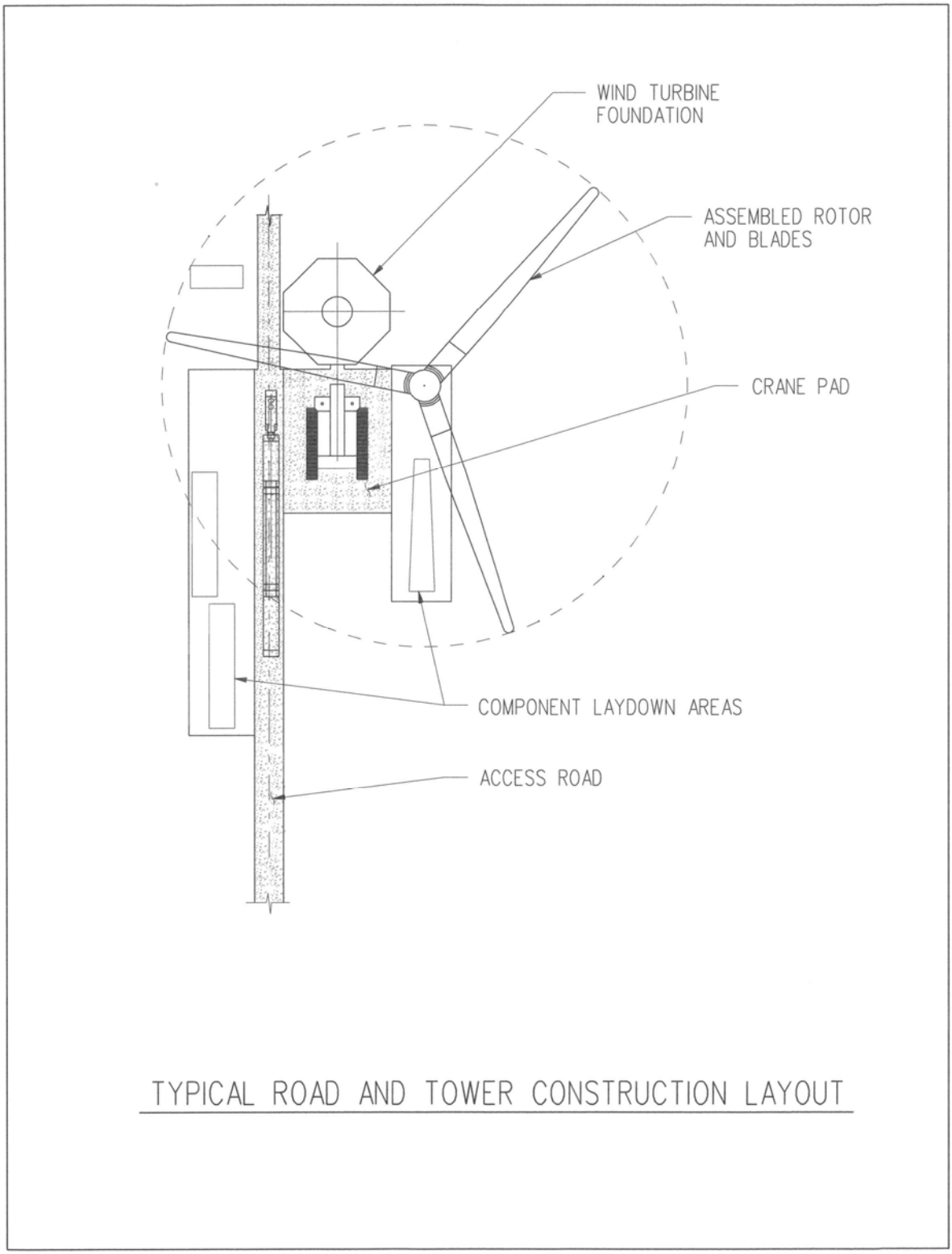


Figure 2.4 Typical Road and Tower Construction Layout.

retopsoiled, and revegetated. Turbine assembly areas would be reduced to a 40 x 40-ft pad area, and road width would be reduced to approximately 16 ft.

Other facilities requiring foundations would include the O&M building, switchyard, substation, transformers, and control building. These foundations would be constructed using standard cut-and-fill procedures and pouring concrete in a shallow slab or using a precast structure set on an appropriate depth of structural fill.

2.2.2 Substation

The primary location of the substation would be located in Section 27, T14N, R54W. However, an alternate substation location has been identified and would be located in Section 30, T14N, R53W. This area would only be utilized based on landowner requirements and would occupy a 10-acre area. The maximum size of the substation will be 400 x 400 ft and would be located within the 20-acre O&M and substation area (refer to Figure 2.1). If the alternate substation would be selected, the O&M building and staging areas (a total of 15 acres) would remain at the original location, and the area for the proposed substation (10-acre area) would not be disturbed. Each substation location is at the intersection of existing country roads; therefore, no new roads would be required to access the substation.

The energy generated by the wind turbines would be delivered to the substation via the underground collection system. At the substation, voltage of the energy would be stepped up from the collection system level of 34.5 kV to the transmission line voltage of 115 kV. Also, other equipment that may be required for interconnection (e.g., capacitor banks) would be installed at the substation to provide the voltage support necessary to meet the interconnection requirements for the project (see Figure 2.3). The interconnection (i.e., tap line) to the existing transmission line would occur directly through short segments of conductor and no buried or aboveground structures (i.e., power poles) would be required. A small control building would be installed within the substation for electrical metering equipment. The supervisory control and data acquisition (SCADA) system for control of the wind turbines would be installed in the O&M building.

2.2.3 Trenching and Placement of Underground Electrical and Communications Cables

Underground electrical and communications cables would be placed in approximately 1.5-ft wide trenches along the length of each turbine string corridor or buried using a cable plow. In some cases, trenches would run from the end of one string to the end of an adjacent string to connect more turbines together via the underground network. Trenches would be excavated to a depth of approximately 4 ft, and electric distribution and communications cables would be placed in the trench using trenching machines. Electrical cables, equalizer cables, and communication cables would be installed, and the trench would be backfilled and compacted in a single pass operation. Trench areas would be revegetated concurrently with revegetation of other construction areas.

2.2.4 Overhead Electrical Power and Communication System

All of the project's electrical and communications systems would be installed underground. However, if any overhead collector lines would be constructed, they would be installed in conformance with Western's standards, the National Electric Safety Code, the American National Standards Institute, and *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006).

2.2.5 Required Marking and Lighting of Wind Turbines

Federal Aviation Administration (FAA) regulations require that an aeronautical study be conducted by the FAA on all structures taller than 200 ft. The purpose of the aeronautical study is to determine if the proposed structure poses a threat to air navigation in the area and to also determine marking and lighting requirements for the structure. The wind turbines proposed for this project would be taller than 200 ft, so an aeronautical study would be conducted by FAA. In accordance with FAA regulations, GEI submitted an individual Notice of Proposed Construction to the FAA for each wind turbine in a preliminary site plan for their review. The FAA completed their review of the preliminary site plan and determined that none of the wind turbines exceed obstruction standards and would not be a hazard to air navigation.

STW would comply with FAA marking and lighting guidance presented in FAA Advisory Circular, AC 70/7460-1K, *Obstruction Marking and Lighting* (FAA 2007). To eliminate the need for daytime light, STW would install white towers, turbines, and blades that meet FAA marking requirements. In addition, nighttime lighting of the wind turbines would also comply with FAA guidance. For the STWF Project, the FAA would likely require a medium intensity red strobe synchronized flashing warning light (L-864) on top of the nacelle of the turbines located at the end of each turbine "string" plus lighting on every third or fourth turbine. The exact turbines that would be equipped with lighting would be specified by the FAA. If STW wants to change the location of any of the wind turbines, they are required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location. In order to minimize potential impacts to avian species, flashing lights would be used on wind turbines requiring FAA pilot warning lights.

2.2.6 O&M Building Construction

The O&M building would be constructed in the project area and would consist of a neutral-colored metal building approximately 50 ft wide x 60 ft long (see Figure 2.5). During the construction phase of the project, the staging area would be located in the area adjacent to the O&M site (refer to Figure 2.1). The prefabricated building would be installed on a concrete slab and would be wired for electricity to run lights and power tools. The O&M building would likely contain a simple plumbing system, in which fresh water is trucked in and stored in a cistern or aboveground tank and used water is stored in holding tanks and then disposed of at an approved off-site facility. Alternatively, STW may opt to construct a well and septic system. Any septic system would be constructed in conformance with county, and Nebraska Department of Environmental Quality regulations and permitted accordingly.

2.2.7 Final Road Grading, Erosion Control, and Site Cleanup

During final road grading, surface flows would be directed away from cut-and-fill slopes and into ditches that outlet to natural drainages. STW would implement a SWPPP, as required by the EPA and the NDEQ, and the plan would include standard sediment control devices (e.g., silt

Figure 2.5 Typical O&M Building.

fences, straw bales, erosion netting, soil stabilizers, check dams) to minimize soil erosion after construction activities. STW or its agents would rent dumpsters from a local sanitation company to collect and dispose of waste materials. Following construction, STW would ensure that all unused construction materials and waste are picked up and removed from the project area. STW would hire a contractor to provide an adequate number of portable toilets in the project area during construction and would ensure that sanitary wastes would be removed and disposed of at an approved facility in accordance with state and local laws.

The O&M building would be used to store parts and equipment needed for O&M. While STW does not anticipate the substantive use of any liquid chemicals within the project area, STW would inspect and cleanup the project area following construction to ensure that no solid waste (e.g., trash) or liquid wastes (e.g., used oil, fuel, turbine lubricating fluid, solvents, etc.) were inadvertently spilled or left on-site. A final site cleanup would be made in conjunction with construction site reclamation.

Cleanup crews would patrol construction sites on a regular basis to remove litter. A final site cleanup would be made prior to shifting responsibilities to O&M crews. O&M crews would continue to use dumpsters for daily maintenance.

2.2.8 Public Access and Safety

Public access to private lands is already restricted by landowners and would continue to be restricted in accordance with easement agreements.

Safety signing would be posted around all towers (where necessary), transformers, and other high voltage facilities and along roads in conformance with applicable state and federal regulations.

In accordance with recommendations by the American Wind Energy Association (2008), STW has completed following public safety evaluations.

STWF project has been evaluated for potential interference to existing radio transmitters and microwave reflector facilities by the National Telecommunications Information Administration, and it was determined that the U.S. Air Force and Western have crucial communication links within the STWF project boundary. To eliminate potential interference, STW has made appropriate adjustments to the turbine layout to avoid any potential areas of interference. In addition, STW would continue to work with the U.S. Air Force and Western to ensure that the crucial communication links are maintained and that the wind turbines would not interfere with existing communication linkages. Therefore, with continued coordination between STW, the U.S. Air Force, and Western, no adverse impacts to existing radio transmitters or microwave beam paths are anticipated as a result of the STWF Project.

Additionally, STW has submitted and received the "determinations of no hazard to air navigation" decision from the FAA for all 40 wind turbines proposed for the STWF Project. The determination of no hazard to air navigation means that the specific locations of the proposed wind turbines would not pose a threat to any airport or to aviation safety in the area. In addition,

there are no known military operating areas within or near the STWF project area that could pose a hazard to military flight operations. If, at a later date, STW wants to change the location of any of the wind turbines, STW is required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location. Therefore, the STWF Project would have no adverse impacts to aviation safety in the area.

In addition, an evaluation of potential interference of various radar systems has been completed using the FAA long-range radar tool, and it has been determined that the placement of the wind turbines within the STWF project area would not interfere with the operation of Air Defense and Homeland Security (i.e., long range radar) or Doppler weather radar (i.e., NEXRAD) systems in the area. Therefore, the STWF Project would have no adverse impacts on various radar systems that serve the general area.

2.2.9 Operations and Maintenance

STW or its contractor would operate and maintain the wind project for approximately 30 years. All turbines, collection and communications lines, and transmission lines would be operated in a safe manner according to standard industry operation procedures. Routine maintenance of the turbines would be necessary to maximize performance and to detect potential difficulties. Each turbine would be remotely scanned by computer every day to ensure that operations are proceeding efficiently. Any problems would be promptly reported to on-site O&M personnel, who would perform both routine maintenance and most major repairs. Most servicing would be performed up-tower, without using a crane to remove the turbine from the tower. Additionally, all roads, pads, and trenched areas would be regularly inspected and maintained to minimize erosion.

Access roads would be maintained during O&M to prevent off-road detours due to ruts, mud holes, landslides, etc. Roads would be maintained as needed. It is anticipated that maintenance would occur twice per year, but more frequent maintenance would be performed, if needed, to maintain roads in a condition acceptable to the county (for county roads) and to the landowner (for private roads). All fuels and/or hazardous materials would be properly labeled and stored

during transportation and at the job site. Workers would be instructed to keep all job sites in a sanitary and safe condition. Workers would be expected to respect the property rights of private landowners.

2.2.10 Work Force

Construction of the 60-MW project would require approximately 50 people per day during the construction period. Reclamation would require about five people. Construction crews would likely work 10- to 12-hour workdays, 6 days per week. O&M would require an estimated four full-time personnel.

2.2.11 Traffic

Construction of wind project facilities (towers, turbines, buildings) would occur simultaneously, using single vehicles for multiple tasks. During normal O&M, daily traffic to and from the site would include one or two four-wheel drive pickups. During both construction and O&M, STW or its contractors would use water, as necessary, to control dust from traffic. Snow removal equipment (trucks equipped with wing-style blades) would be utilized as needed during winter.

2.2.12 Water Use

Water for construction and dust control would be obtained from commercial or private sources. STW estimates that it would use approximately 26.5 acre-ft of water for construction and dust control during the construction stage of the project.

2.2.13 Hazardous Materials

Some large equipment would be fueled on-site, and some small spills of petroleum products may occur due to periodic equipment maintenance and/or accidents. If such spills occur, petroleum-contaminated soils would be disposed of in accordance with the Spill Prevention, Control, and Countermeasures Plan (SPCCP) and direction from the NDEQ as appropriate. Typical

hazardous chemicals and petroleum products used in equipment during the construction and decommissioning phases of a wind energy facility include diesel fuel, gasoline, gearbox oils, hydraulic fluids, lubricants, cleaning fluids, paints, degreasers, and other similar substances. Typical hazardous chemicals and petroleum products used in equipment during the O&M phase of the wind energy project include mineral oil, diesel fuel, gasoline, gearbox oils, hydraulic fluids, lubricants, and cleaning fluids. All nonhazardous wastes would be disposed of in accordance with appropriate county, state, and federal regulations.

Operators would handle and dispose of all hazardous wastes in accordance with applicable state and federal rules and regulations. Any release of hazardous substances in excess of reportable quantities, established in 40 C.F.R. 117, would be reported as required by *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (as amended). If a release of a reportable quantity of any hazardous substances occurs, a report would be provided to NDEQ and all other appropriate federal, state, and county agencies.

STW and its contractors would comply with all applicable hazardous material laws and regulations existing or hereafter enacted or promulgated regarding these chemicals and would implement the SPCCP, as necessary. When work is conducted in the project area, fuels and coolants would be contained in the fuel tanks and radiators of vehicles or other equipment, so the chance of a spill would be negligible.

2.2.14 Reclamation and Decommissioning

After initial construction, reclamation would be conducted on all disturbed areas to comply with easement agreements. The short-term goal of reclamation would be to stabilize disturbed areas as rapidly as possible, thereby protecting sites and adjacent undisturbed areas from degradation.

After construction is complete, temporary work areas would be backfilled and graded to the approximate original contour, and the area would be revegetated with seed mixtures appropriate to the landowners. STW would consult with the Natural Resources Conservation Service (NRCS) on appropriate reclamation methods and seed mixtures and would obtain approval from

landowners to implement the appropriate practices. Most post-construction work would entail stabilizing slopes, scarifying soils to reduce compaction, and reseeding unused disturbed areas, including portions of turbine pads not required for O&M, road cuts and fills, underground power line trenches, and overhead power line routes.

At the end of the project's useful life (about 30 years), STW would obtain any necessary authorization from the appropriate regulatory agency or landowner to abandon the wind project. Turbines and towers would be removed and recycled or disposed of at approved facilities. Foundations would be abandoned in place to a depth of 3 to 4 ft below grade. All private project roads would revert to landowner control. Underground power and communication lines would also be abandoned in place (3-4 ft below grade), and overhead power lines and poles would be removed. Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time that the area is to be reclaimed and would include regrading, topsoiling, and revegetation of all disturbed areas. This EA does not address the potential that the project could be repowered (i.e., new or refurbished turbines could be installed after the life of project). Additional environmental analysis and permitting may be required if the site is not abandoned as currently proposed.

2.2.15 GEI-committed Mitigation Measures

STW also proposes to implement the following mitigation measures to avoid, reduce, or eliminate project impacts related to GEI's Proposed Action.

2.2.15.1 Fire Control

STW would notify the appropriate landowners and the county sheriff's office of any fires observed during construction. In the event of a fire, STW or its contractors would initiate fire suppression actions in the work area. Suppression would continue until the fire is out or until the crew is relieved by an authorized representative of the landowner on whose land the fire occurred. Heavy equipment would not be used for fire suppression outside the project area without prior approval of the landowner unless there is imminent danger to life or property.

STW or its contractors would be responsible for all costs associated with the suppression of fires and the rehabilitation of fire damage resulting from its operations.

STW would designate a representative to be in charge of fire control during construction. The fire representative would ensure that each construction crew has appropriate types and amounts of firefighting tools and equipment, such as extinguishers, shovels, and axes, available at all times. STW would, at all times during construction and operation, require that satisfactory spark arresters be maintained on internal combustion engines.

2.2.15.2 Cultural Resources

STW would not conduct any ground-disturbing activities on any lands that have not been inventoried by a qualified archaeologist for cultural resources. All inventory reports would be submitted to the Nebraska State Historic Preservation Officer (SHPO) for review and approval before the proposed ground disturbing activity is initiated. STW would comply with any Nebraska SHPO recommendations.

Based on the result of current cultural resource inventories, STW would avoid National Register of Historic Property (NRHP)-eligible Site 5KM22 by a minimum of 300 ft.

Construction and O&M personnel would be instructed that they are not allowed to search for or remove cultural resources while working on this project.

If any cultural resource (historic or prehistoric site or object) is discovered by STW or any person working on its behalf during construction, O&M, or decommissioning operations, STW would suspend all construction operations in the immediate area of any such discovery and immediately notify the State of Nebraska SHPO and would implement appropriate mitigation measures for NRHP eligible sites.

2.2.15.3 Paleontological Resources

Any paleontological resource discovered by STW or any person working on its behalf would be immediately reported to the Nebraska Geological Survey (NGS). STW would suspend all operations within 100 ft of such discovery until written authorization to proceed is issued by NGS. An evaluation of the discovery would be made by NGS to determine appropriate actions to prevent the loss of scientific values. STW would be responsible for the cost of evaluation, and any decision as to proper mitigation measures would be made by NGS after consulting with STW.

Construction personnel would be instructed not to remove or disturb any fossil materials. Instructions would also stress the nonrenewable nature of paleontological resources and that fossils are part of Nebraska's prehistoric heritage.

2.2.15.4 Air Quality/Noise

All vehicles and construction equipment would be maintained to minimize exhaust emissions and would be properly muffled to minimize noise. Mitigation for impacts to air quality would include the following:

- dust abatement techniques (e.g., spraying water) would be used on unpaved and unvegetated surfaces to minimize dust emissions;
- if required, commercially available dust suppressants would be used;
- STW and its contractors would post and enforce a speed limit of 25 mph on roads developed for the project to reduce fugitive dust emissions from traffic;
- disturbed soils or construction material (e.g., concrete) would be covered if they become a source of fugitive dust; and
- disturbed areas would be reclaimed and revegetated as soon as possible after construction.

2.2.15.5 Vegetation (Including Agricultural Lands)

To minimize impacts to vegetation, STW would implement the following measures.

- Surface disturbance would be limited to that which is necessary for safe and efficient construction.
- All surface-disturbed areas would be restored to the approximate original contour and reclaimed in accordance with easement agreements.
- Removal or disturbance of vegetation would be minimized through site management (e.g., by utilizing previously disturbed areas, designating limited equipment/materials storage yards and staging areas, scalping) and reclaiming all disturbed areas not required for operations.

2.2.15.6 Noxious Weeds

To prevent and control the spread of noxious weeds, STW would implement the following measures:

- conduct revegetation operations as soon as possible after construction operations are completed;
- use certified weed-free reclamation materials;
- wash equipment at a commercial facility prior to entering the project area; and
- if herbicides are needed to control weeds, they would be applied by a licensed contractor.

2.2.15.7 Streams and Wetlands

STW would comply with all federal regulations concerning the crossing of wetlands and waters of the U.S. (WUS), as listed in Title 33 C.F.R. Part 323. No known perennial streams or wetlands occur in the project footprint area (refer to Sections 3.3.1 and 3.4.1). To minimize impacts from construction activities, STW would implement the following measures.

- Sediment control measures (specified in a SWPPP) would be implemented. This includes design and installation of culverts, rip rap, and catchment basins where appropriate.
- Vegetation and soil disturbance would be limited to that which is necessary for construction.
- STW would comply with all hazardous material laws and regulations.
- STW would develop and implement a SPCCP.

2.2.15.8 Soils

The following measures would be implemented to minimize impacts to soils.

- No construction or routine maintenance activities would be conducted when soil is too wet to adequately support construction equipment (i.e., if such equipment creates ruts in excess of 4 inches deep).
- Certified weed-free straw mulches, certified weed-free hay bale barriers, silt fences, and water bars would be used to control soil erosion.
- Soil erosion control measures would be monitored, especially after storms, and would be repaired or replaced if needed.
- Surface disturbance would be limited to that which is necessary for safe and efficient construction.
- All surface-disturbed areas would be restored to the approximate original contour and reclaimed in accordance with easement agreements.
- Construction activities in areas of moderate to steep slopes (~15-45%) would be avoided, where possible.

2.2.15.9 Wildlife

The following measures would be implemented to minimize impacts to wildlife.

- STW would prohibit hunting, fishing, dogs, or possession of firearms by its employees and its designated contractor(s) in the project area during construction, operation, and maintenance.

- Surface disturbance would be avoided or minimized in areas of high wildlife value (e.g., prairie dog colonies and shelterbelts).
- STW would advise project personnel regarding appropriate speed limits on roads to minimize wildlife mortality due to vehicle collisions. Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor would be disciplined and may be dismissed by STW and/or prosecuted by the NG&PC.
- Travel would be restricted to designated roads and construction areas, and no off-road travel would be allowed except in emergencies.

The following additional measures would be implemented to minimize impacts to raptors.

- STW would not install any wind turbines within 1.0 mi east and south of the golden eagle nest located in Section 22, T14N, R54W, near the northwest border of the project area.
- Prior to construction, raptor nest surveys would be conducted within a 1.0-mi radius of proposed construction areas during the raptor nesting season (January 1 through July 31) to determine nest location, activity status, and, if possible, species prior to construction.
- If raptors are found nesting within or near the project area, construction would be sequenced to avoid construction activities within 0.25 mi of any active Swainson's or red-tailed hawks nest and/or 150 ft from any burrowing owl nest until the young have fledged or the nest is abandoned or has failed.
- Additional mitigation for raptors would be designed on a site-specific basis, as necessary, in consultation with the USFWS and NG&PC. STW would notify the USFWS or NG&PC immediately if raptors are found nesting on project facilities (i.e., power poles, towers).
- Construction of new power lines would follow the recommendations of the Avian Power Line Interaction Committee (2006) to avoid electrocution of raptors and other avifauna.

- Post-construction avian and bat mortality surveys would be conducted for 2 years following construction.
- Lighting the wind turbines would be in accordance with USFWS and FAA recommendations to aid in the reduction of avian and bat mortalities.

In addition to the conservation measures stated above, an Avian and Bat Protection Plan (ABPP) would be developed to minimize and mitigate any unforeseen impacts to avian and bat species that may occur as a result of the project. The ABPP is recommended as a way to identify and minimize risk to all migratory and residential birds (NG&PC 2011a). The use of an ABPP for this project would reduce and mitigate impacts to avian and bat species. The ABPP would utilize adaptive management to address any unforeseen impacts to birds and bats due to collisions with the turbines or barotrauma in the case of bats.

2.2.15.10 Federally Listed Threatened, Endangered, Proposed, and Candidate Species, Migratory Birds, and State-listed Threatened and Endangered Species

The following mitigation measures would be implemented to minimize impacts to federally listed threatened, endangered, proposed, and candidate (TEPC) and state-listed threatened and endangered (T&E) species.

To minimize impacts to state-sensitive species that may occur within the project area, STW would limit the surface disturbed areas to that which is needed for safe and efficient construction, and all disturbed areas not needed for operation would be reclaimed as soon as possible after construction is complete. Additional mitigation measures for migratory birds and two state-sensitive species--mountain plover and swift fox--are presented below.

- To minimize potential impacts to mountain plover, preconstruction nest surveys would be conducted in suitable habitat within proposed disturbance areas.
- If mountain plover nests are located, STW would avoid construction within 0.25 mi of the nest until the chicks are mobile, unless otherwise approved by NG&PC.

- To minimize impacts to migratory birds and the state-listed mountain plover, STW would use standard bird-friendly wind energy turbine and project design technology, including unguyed tubular towers and slow-rotating upwind rotors.
- To minimize potential impacts to nesting migratory birds, the removal of natural vegetation (grassland and shrubs) would be minimized to the extent possible during construction.
- Overhead power lines would be constructed per the *Suggested Practices for Raptor Protection on Power Lines:the State of the Art in 2006* (Avian Power Line Interaction Committee 2006).
- To minimize impacts to mountain plover, STW would not place turbines or conduct construction activities within 2.0 mi of mountain plover core habitat east of Nebraska State Highway 71.
- To minimize impacts to swift fox and their dens, preconstruction surveys would be conducted to locate any potential dens, and STW would avoid disturbance of these areas by 0.25 mi until any young have left the den.
- All collector lines would be buried to avoid impacts to migratory birds and bats from possible collision or electrocution.

2.2.15.11 Sanitation

Construction sites would be maintained in a sanitary condition at all times. Waste materials (e.g., human waste, trash, garbage, refuse) would be disposed of promptly at an appropriate licensed waste disposal site. STW and its contractors would prohibit littering in the project area.

2.2.15.12 Existing Utilities

STW would notify other authorized easement users of any crossings or overlaps. Care would be used, including hand/shovel excavation where appropriate, for all construction work that parallels or crosses existing subsurface facilities (e.g., pipelines, cables, power lines).

2.2.15.13 Ditches and Culverts

All irrigation, overflow, and roadway ditches, lead-offs from culverts or cut sections, and lead-in ditches crossed by the project would be cleared of any material that may obstruct water flow. Work would be accomplished so that reasonable conformance to the previous line, grade, and cross section is achieved. If any culverts clog due to project activities, the culvert would be cleaned to provide an unobstructed flow to and through the culvert. Any loose material on the backslope adjacent to the entrance of the culverts would be removed.

2.2.15.14 Public Safety

To minimize potential interference to existing radio transmitters and microwave reflector facilities, STW would continue to work with the U.S. Air Force to ensure that the crucial communication links are maintained and that the wind turbines would not interfere with existing communication linkages.

If STW wants to change the location of any of the wind turbines, STW is required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location.

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, Western would not execute an interconnection agreement with STW, and the wind project would not be constructed and interconnected with Western's transmission system. Western's determination not to approve the interconnection request could make the proposed project infeasible. STW could continue to pursue the project by applying for interconnection with another transmission provider in the vicinity; however, Western could not speculate on whether access to alternative transmission is a technically and economically feasible option for STW. The electrical generation capacity of the project could change depending on the transmission capacity of the alternative transmission provider and other factors could make the project infeasible. However, for the purposes of this EA, which discusses the potential impacts

of Western's decision, the No Action Alternative is considered to result in the project not being constructed and the environmental impacts associated with the project would not occur.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

2.4.1 Alternative Turbine Locations

The project proposed alternative turbine arrays in the project study area. STW used wind resource analysis software to determine the most energy efficient array. Additionally, based on agency comments on potential resource impacts, particularly to raptor nests, mountain plovers, swift fox, and intermittent streams, alternative turbine arrays were designed and adopted as described above under the GEI's Proposed Action.

2.4.2 Alternative Project Generation Capacity

A 120-MW size project was considered; however, based on the system impact study (Western 2011), it was determined that current capacity and configuration of the Sidney-Archer transmission line was not available without the construction of new transmission lines. Therefore, the scope of the project was reduced to 60-MW.

2.4.3 Alternate Project Areas

GEI considered other potential project areas in Nebraska. GEI consulted with both USFWS and NG&PC early in their siting process. Several alternate project areas to the east, each with quality wind resource availability and access to transmission, were rejected, as these sites were more predominately in the whooping crane migration path, and thus determined to be more environmentally impactful.

Additionally, GEI considered a project area that extended east into Cheyenne County. That area was also rejected due to a higher incidence of range and pastureland and the greater distance from existing transmission lines.

This page is intentionally left blank.

3.0 ENVIRONMENTAL ANALYSIS

Descriptions of the natural, human, and cultural environmental resources present in the project area are presented below by resource. For the purposes of this analysis, the project area for each resource includes all land within the project area boundary depicted on the maps unless otherwise noted.

This chapter describes the affected environment and environmental consequences of Western's and GEI's Proposed Actions and the No Action Alternative. Direct and indirect impacts of each Proposed Action and the No Action Alternative are identified for each resource. Project impact areas are identified for resource topics for the areas that may be affected by the construction, operation, and decommissioning phases of the project. Impacts are described accordingly to whether the effects would be short-term or long-termed, direct or indirect. Cumulative effects of the project with past, present, and reasonably foreseeable future developments are discussed in Section 3.14 at the end of this chapter.

3.1 CLIMATE AND AIR QUALITY

3.1.1 Environmental Setting for the Proposed Project

3.1.1.1 Climate

The regional climate in the project area is semi-arid and continental, with warm (sometimes hot) dry summers and cold dry winters typical of the Great Plains (U.S. Department of Agriculture [USDA] 2005). The project area is located in the western high plains ecosystem, which is characterized by a semi-arid climate. Average monthly precipitation, measured at the Kimball Airport from 1893-2010, ranged from 0.28 to 2.76 inches per month with most of the precipitation occurring during the months of May through July as rain. Average annual precipitation is 16.79 inches, and average annual snow fall is 41.0 inches with most the snow fall occurring in March and April (Table 3.1). The area is drained by several unnamed intermittent

Table 3.1 Period of Record (1893-2010) Monthly Climate Summary for Kimball, Nebraska.[1]

	Month												
Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Average max. temperature	40.2	43.0	49.4	59.6	69.5	80.3	87.6	86.0	76.8	64.3	50.0	41.5	62.3
Average min. temperature	13.5	16.0	22.2	31.0	40.8	50.1	56.1	54.2	44.4	33.0	22.1	15.2	33.2
Average total precipitation (inches)	0.38	0.46	1.06	1.82	2.76	2.68	2.59	1.79	1.26	0.91	0.56	0.50	16.79
Average total snow fall (inches)	5.0	5.5	9.1	6.2	1.0	0.0	0.0	0.0	0.2	2.1	5.4	6.3	41.0
Average snow depth (inches)	1	0	0	0	0	0	0	0	0	0	0	1	0

[1] Source: Western Regional Climate Center (WRCC 2011).

drainages with Sand Draw as the primary drainage that crosses the northern portion of the project area.

The site is located in a Class IV wind area, which are areas defined as having good wind power development potential. Wind speeds at 164 ft above the ground average are 16.6 to 17.7 mph, and prevailing winds are from the northwest (National Renewable Energy Laboratory 2011).

3.1.1.2 Air Quality

The Nebraska air regulations are primarily based on regulations developed by the EPA to address the *Clean Air Act* requirements. *The Clean Air Act* gives the EPA authority to establish National Ambient Air Quality Standards (NAAQS). Ambient air is the air humans have access to outdoors and doesn't include air on private property.

These standards are based on each pollutant's effects on our health and environment. The pollutants covered by NAAQS are termed criteria pollutants because their standards are based on criteria specific to each of them. There are NAAQS for particulate matter less than 10 microns

in diameter, particulate matter less than 2.5 microns in diameter, sulfur dioxide, nitrogen oxide, carbon monoxide, ozone, and lead.

The EPA also has the authority to regulate toxic or hazardous air pollutants not covered by NAAQS, and the EPA and states have established emission standards for air pollutants. These standards establish emission limits or control technology requirements for specific source categories or industries (Table 3.2).

Since Colorado is only approximately 7 mi south of the project area, the Colorado air quality standards are also presented. One of the goals of air quality regulatory programs is to ensure that concentrations of pollutants in the air do not exceed these standards.

Areas where area quality exceeds the NAAQS or state air quality standards are called nonattainment areas, and states must develop plans for attaining and maintaining the NAAQS. According to the NDEQ, the entire state of Nebraska is in attainment status and is in compliance with NAAQS statewide; therefore, no nonattainment air quality areas occur within the STWF project area (personal communication, September 2, 2011, with Brad Pracheil, Program Specialist, NEDQ/Air Quality Division).

3.1.2 Environmental Impacts and Mitigation Measures

3.1.2.1 Impacts of Western's Proposed Action

No surface disturbance or emission would occur under Western's Proposed Action, therefore there would be no impacts to climate and air quality as a result of Western's Proposed Action.

3.1.2.2 Impacts of GEI's Proposed Action

Project sources of air emissions, pollutants emitted, and factors contributing to the magnitude of project emissions are presented in Tables 3.3 and 3.4.

Table 3.2 Selected National, Nebraska, and Colorado Air Quality Standards (μg/m^3).

Pollutant/Averaging Time	NAAQS[1]	CAAQS[2]	NEAAQS[3]	PSD Class I Increment[4]	PSD Class II Increment[4]
Carbon Monoxide (CO)					
1-hour[5]	40,000	40,000	40,000	--[6]	--[6]
8-hour[5]	10,000	10,000	10,000	--	--
Nitrogen Dioxide (NO_2)					
Annual[7]	100	100	100	2.5	25
Ozone					
1-hour[5]	--[8]	235	235	--[6]	--[6]
8-hour[9]	157	157	157	--	--
Particulate Matter at Less than 10 Microns (PM_{10})					
24-hour[5]	150	150	150	8	30
Annual[7]	--[8]	50	--[8]	4	17
Particulate Matter at Less than 2.5 Microns ($PM_{2.5}$)					
24-hour[10]	35	35	35	--[6]	--[6]
Annual[7]	15	15	15	--	--
Sulfur Dioxide (SO_2)					
3-hour[5]	1,300[11]	700	1,300	25	512
24-hour[5]	365	365	365	5	91
Annual[4]	80	60	80	2	20

1 NAAQS = National Ambient Air Quality Standards (adapted from 40 C.F.R. 50.5-50.12). Primary standard unless otherwise noted. National Primary Standards establish the level of air quality necessary to protect public health from any known or anticipated effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.

2 CAAQS = Colorado Ambient Air Quality Standards.

3 NEAAQS = Nebraska Ambient Air Quality Standard.

4 The prevention of deterioration (PSD) demonstrations serves information purposes only and do not constitute a regulatory PSD increment consumption analysis.

5 No more than one exceedance per year.

6 No PSD increments have been established for this pollutant.

7 Annual arithmetic mean.

8 The NAAQS for this averaging time for this pollutant has been revoked by EPA.

9 Average of annual fourth-highest daily maximum 8-hour average.

10 An area is in compliance with the standard if the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year, averaged over 3 years, is less than or equal to the level of the standard.

11 Secondary standard. National Secondary Standards establish the level of air quality to protect the public welfare by preventing injury to agricultural crops and livestock deterioration of materials and property and adverse impacts to the environment.

Table 3.3 Project Emission Profile.

Source/Activity	Pollutant	Basis for Emission Factors
Vehicular traffic and construction and reclamation equipment operation	CO, NO_x, VOCs, $PM_{2.5}$ and PM_{10}, SO_2, air toxics	Vehicle-mile traveled (VMT)
Fugitive dust from vehicles traveling on unpaved roads	$PM_{2.5}$ and PM_{10}	VMT, wet days, control factor, road conditions, tire adjustment
Fugitive dust from operation of construction equipment	$PM_{2.5}$ and PM_{10}	Volume of fuel used

Construction, operation, and decommissioning activities would be required to comply with the provisions of the *Nebraska Environmental Protection Act,* Neb. Rev. Stat. §81-1501 et. seq. and other applicable state and county regulations.

Possible impacts to air quality as a result of the project would occur during the construction, O&M, and decommissioning phases due to short-term increases in particulates (e.g., dust from the excavation of wind turbine foundations and collector system, construction of access roads, and tailpipe emissions from construction and O&M vehicles and combustion emissions from generators and engines).

It is not anticipated that any state or federal air quality standards would be exceeded due to the construction or operation of the project, and no adverse impacts to air quality is expected. The project is expected to be in compliance with NAAQS, NEAAQS, and CAASQ. Climate would not be impacted by the proposed project (Keith et al. 2004).

Construction Phase

Construction of access roads and preparation of turbine sites would involve the use of earth-moving equipment, including loaders, various-sized bulldozers, and backhoes. Delivery of turbine components and substation components, as well as electrical cable and other ancillary

Table 3.4 Estimated Total Air Quality Emissions for the STWF Project.

	Anticipated Emissions (Tons)						
Emission Source	PM_{10}	TSP	VOC	NO_X	CO	SO_2	HAP
Construction Phase (Year 1)							
Unpaved roads	12.00	39.00	--	--	--	--	--
Vehicle exhaust	0.00	0.00	0.01	0.10	0.05	0.00	0.00
Crane operation	0.10	0.10	0.13	2.20	0.62	0.34	--
Topsoil removal/replacement	3.31	4.30	--	--	--	--	--
Road construction	1.97	2.53	--	--	--	--	--
Aggregate delivery	0.05	0.10	--	--	--	--	--
Construction Phase Total	17.43	46.03	0.14	2.30	0.67	0.34	0.00
Operation Phase (Year 2-29)							
Unpaved roads	34.00	111.00	--	--	--	--	--
Vehicle exhaust	0.00	0.00	0.04	0.05	0.64	0.00	0.00
Operation Phase Total	34.00	111.00	0.04	0.05	0.64	0.00	0.00
Decommission Phase (Year 30)							
Unpaved roads	5.00	16.00	--	--	--	--	--
Vehicle exhaust	0.00	0.00	0.002	0.004	0.009	0.000	0.000
Crane operation	0.10	0.10	0.13	2.20	0.62	0.34	-
Topsoil removal/replacement	0.73	0.95	--	--	--	--	--
Road decommission	1.97	2.53	--	--	--	--	--
Decommission Phase Total	7.80	19.58	0.132	2.204	0.629	0.34	0.00
Life-of-Project Emissions							
Construction Phase Total	17.43	46.03	0.14	2.30	0.67	0.34	0.00
Operation Phase Total	34.00	111.00	0.04	0.05	0.64	0.00	0.00
Decommission Phase Total	7.80	19.58	0.132	2.204	0.29	0.34	0.00
Grand Total	59.23	176.61	0.312	4.554	1.939	0.68	0.00

equipment and supplies, would involve the use of delivery trucks, semis, and assembly cranes over the same time frame. Emissions from these activities include fugitive dust (e.g., $PM_{2.5}$ and PM_{10}) and tailpipe emissions (CO, NO_x, VOCs, particulates, SO_2, and HAPs) (refer to Table 3.4).

Approximately 259.9 acres of soil would be initially disturbed for construction of the STWF Project, and fugitive dust from construction activities and travel on project roads would be controlled. In general, water would be used for dust suppression in active work areas. In the event that additional dust control is necessary, other commercially available dust suppressants may be utilized, including chloride compounds, lignin compounds, or tree resin emulsion products.

Activities associated with foundation installation include grading, excavating, and substation installation and operation. Construction is anticipated to last for approximately 6 months with overlapping activities of turbine installation and project support facilities.

Tailpipe emissions and fugitive dust emissions would likely not cause a violation of ambient air quality standards or degradation of regional air quality.

Implementation of environmental protection measures identified in Sections 2.1.16 and 2.1.17 during construction, including the utilization of dust abatement techniques, posting and enforcing speed limits, and covering or watering batch plant storage piles, would minimize impacts on air quality due to fugitive dust.

In addition to the regulated criteria pollutants, minor quantities of green house gases (GHG) gases would be emitted as a result of fuel combustion from vehicles and other mobile equipment. GHG emissions from these sources would primarily be in the form of CO_2. CO_2 is not a currently regulated pollutant, and methods for quantifying and assessing GHG impacts are not readily available. GHG emissions from the construction phase of this project, primarily CO_2, would be short in duration (<1 year) and of such minor quantities as to have no measurable effect on climate change.

O&M Phase

During operation, using wind power instead of burning fossil fuels to generate electricity would have beneficial impacts on air quality because GHG and other pollutants emitted by conventional fossil fuel combustion would not be produced. The term "beneficial" is used to describe the favorable impact of using a nonpolluting resource to generate electricity, it does not reflect any proactive cleanup to improve air quality. Operation also would result in small amounts of dust and tailpipe emissions from O&M vehicle traffic (refer to Table 3.4).

Daily O&M activities that would contribute to a limited amount of air emissions include personnel access, occasional road maintenance activities, ongoing reclamation/revegetation activities, and infrequent turbine replacement activities.

Decommissioning Phase

Decommissioning activities are anticipated to be similar to construction activities for vehicle traffic, and a limited amount of heavy equipment operation such as the lifting crane would be used. Only a limited amount of construction activity would occur compared to the initial construction activity. The decommissioning effort may need to re-establish access roads to haul out facility components. Additional decommissioning air quality impacts could be driven by site reclamation activities. Decommissioning air quality impacts are expected to be similar in nature to construction activities, but of a much lesser magnitude (refer to Table 3.4).

In addition to the regulated criteria pollutants, minor quantities of GHG would be emitted as a result of fuel combustion from vehicles and mobile equipment. GHG emissions from these sources would primarily be in the form of CO_2. CO_2 is not a regulated pollutant, and methods for quantifying and assessing GHG impacts are not readily available. GHG emissions from the decommissioning phase of this project, primarily CO_2, would be short in duration (<1 year) and of such minor quantities as to have no measurable effect on climate change.

3.1.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, no dust or tailpipe emissions would occur due to project construction, operation, or decommissioning phases of the project. Conversely, the opportunity to generate electricity using a nonpolluting resource would be lost.

3.1.2.4 GEI's Mitigation Measures

Mitigation for impacts to air quality would include the following:

- dust abatement techniques (e.g., spraying water) would be used on unpaved and unvegetated surfaces to minimize dust emissions;
- if required, commercially available dust suppressants would be used;
- STW and its contractors would post and enforce a speed limit of 25 mph on roads developed for the project to reduce fugitive dust emissions from traffic;
- disturbed soils or construction material (e.g., concrete) would be covered if they become a source of fugitive dust; and
- disturbed areas would be reclaimed and revegetated as soon as possible after construction.

3.2 GEOLOGY, PALEONTOLOGY, AND SOILS

3.2.1 Environmental Setting for the Proposed Project

3.2.1.1 Geology and Mineral Resources

The Ogallala Group of the Miocene Age is the major geologic unit present in the STWF project area (Figure 3.1) This rock unit was deposited approximately 17.5 and 5 million years ago (Fielding et al. 2007). The Ogallala Group is the result of sediment river deposits coming off the eastern slope of the Rocky Mountains with coarse-grained deposits close to the mountain source and finer grained deposits in the eastern part of its depositional area. The Ogallala Group is the main aquifer for much of the Great Plains (Bjorklund 1957).

Figure 3.1 Generalized Geographic Extent of the Miocene Ogallala Group (Modified from Fiorillo 1988).

The topography of the area is relatively flat with areas of small swales draining to Sand Draw. No floodplains or riparian areas occur in the project area. No areas of unique geological features such as caves occur in the project area, and there are no known geological hazards in the immediate project area.

The only mineral extraction within the STWF project area is oil and gas. Several oil and gas wells are scattered throughout the northern portion of the project area. No other known mineral deposit are known to occur in the STWF project area. One small inactive gravel pit is located along the northeast edge of the STWF Project (NWMW Section 30, T14N, R53W); however, there is no sign of recent activity.

3.2.1.2 Paleontology

The only sedimentary rock unit present in the STWF project area is the Ogallala Group (refer to Figure 3.1). The Ogallala Group is a sedimentary deposit that extends from the eastern edge of the Rocky Mountains of Wyoming, Colorado, and New Mexico into Nebraska, Kansas, Oklahoma, and Texas (Ver Ploeg and Boyd 1999). It is an alluvial deposit that is coarse-grained and thick near the mountains, thinning and fining to the east (Flanagan and Montagne 1993). It is composed of sandstone, mudstone, limestone, and thin ash horizons (Cassiliano 1980; Vorrhies 1969). The Ogallala Group/Formation was first described by Darton (1899) in western Nebraska. It is termed as the Ogallala Formation in the western parts of its depositional area (Wyoming) while in its northern and eastern extents, the unit becomes more complex, allowing the differentiation of formations (Harrison, "middle Miocene," Valentine, and Ash Hollow) within the Ogallala Group. The Ogallala Group is the main aquifer for much of the Great Plains, where it occurs in the subsurface (Bjorklund 1957).

Vertebrate fossils are commonly found in the Ogallala group (Lugn 1939; Tedford et al. 1987) with the westernmost concentration having been collected from the Horse Creek- Trail Creek Quarry near Cheyenne, Wyoming (Cassiliano 1980). The quarry's faunal list has a wide variety of taxa, including insects, ostracods, gastropods, fish, reptiles, birds, and mammals. In the east and south where the unit becomes finer grained, many more vertebrate fossil localities are known with a large and varied faunal list.

The Ash Hollow Formation of the Ogallala Group occurs in the area of the STWF Project (Tedford et al. 1987). Lugn (1939) termed the rocks in this area as the "Kimball Formation;" however, Diffendal (1990) later determined that the "Kimball Formation" was not a separate unit, but actually a localized unit within the Ash Hollow Formation. The Ash Hollow Formation in the Kimballl region is aged within the Hemphillian North American Land Mammal "age," approximately 6-8 million years old (Tedford et al. 2004). In the southwestern Nebraska panhandle (Kimball and Sidney counties), the fossil mammalian fauna from the Ogallala Group is very well known and has been grouped together as the composite "Kimball Fauna." It includes sloths, bears, felids, horses, rhinos, and rodents (Tedford et al. 1987).

According to the University of Nebraska Museum and the Paleobiology Database, no fossil vertebrate localities are known in the project area itself, likely the result of private ownership of much of the land. A field investigation was conducted in 2010 by Uinta Paleontological Associates, Inc. (Uinta Paleo) on July 5, 2010, to survey all outcrop rock areas in the project area for fossils. All of the proposed turbine locations are located on level areas well away from any rock outcrop areas. No fossils were found during the field investigation. A sample collected at one of the rock outcrop areas in the vicinity of the turbine corridors shows the rock to be composed of poorly sorted angular clasts of quartz, feldspar, and lithic fragments. However, because of the high fossil-bearing potential of the strata present in the study area, as well as the rugged topography that exposes bedrock along the creeks, it is very possible that vertebrate fossils could be found during construction.

3.2.1.3 Soils

Information regarding soils in the project area were obtained from the USDA's soil datamart (USDA 2011) and Kimball County Soil Survey (USDA 2005). Thirteen different soil types (i.e., map units) occur in the project area (Table 3.5 and Figure 3.2). No unique soils occur in the project area due to the sandy nature of many of the soil types located in the STWF project area that are subject to wind erosion. Many of the agricultural lands not under production maintain some type of plant cover such as wheat stubble to reduce the potential for wind erosion or are in CRP scattered windbreak, which are located throughout the STWF project area and help protect soil from erosion and help keep snow on the fields. Several soil types are identified as prime farmland only under irrigated conditions (USDA 2005). Since no irrigation is occurring in the STWF project area, no prime farmland is located in the project area.

3.2.2 Environmental Impacts and Mitigation Measures

3.2.2.1 Impacts of Western's Proposed Action

There would be no surface disturbance associated with Western's Proposed Action; therefore, no impacts to geology, paleontology, or soils resources would occur under Western's Proposed Action.

Table 3.5 Soil Types Occurring in the STWF Project Area.[1]

Map Unit No.	Map Unit Description	Acres in Project Area
1301	Bayard fine sandy loam, 3 to 6% slopes	131
1327	Bayard fine sandy loam, 0 to 3% slopes	47
1372	Chappell-Bayard-Broadwater, complex, 0 to 2% slopes	214
1508	Altvan-Eckley complex, 3 to 9% slopes	196
1524	Brownson-Rosebud-Canyon loams, 0 to 3% slopes	8
1578	Eckley and Altvan soils, 9 to 50% slopes	79
1725	Rosebud loam, 0 to 1% slopes	1,028
1739	Rosebud-Canyon loams, 1 to 3% slopes	4,448
1744	Rosebud-Hemingford loams, 0 to 1% slopes	113
5607	Broadwater loamy sand, channeled, occasionally flooded	44
5800	Albinas-Cheyenne loams, rarely flooded	23
6032	Tassel-Blanche complex, 9 to 30% slopes	1,885
6041	Tassel-Blanche sandy loams, 3 to 9% slopes	3,031
Total		11,247

[1] Based on USDA's soil datamart (2011). Soil map units number differ for USDA (2005).

3.2.2.2 Impacts of GEI's Proposed Action

Construction Phase

Geology. The proposed project would not impact the area's physiography. Minor impacts to topography would include temporary or permanent changes in the land surface and slope due to cut-and-fill activities required to excavate foundations and build roads. Any cut-and-fill areas that are not needed for operations would be regraded to the approximate original contour and reclaimed in accordance with landowner wishes. Construction would not occur in ephemeral channels. During construction, temporary drainage structures such as ditches, culverts, waterbars, and/or check-dams would be used, as needed, to divert runoff around wind project

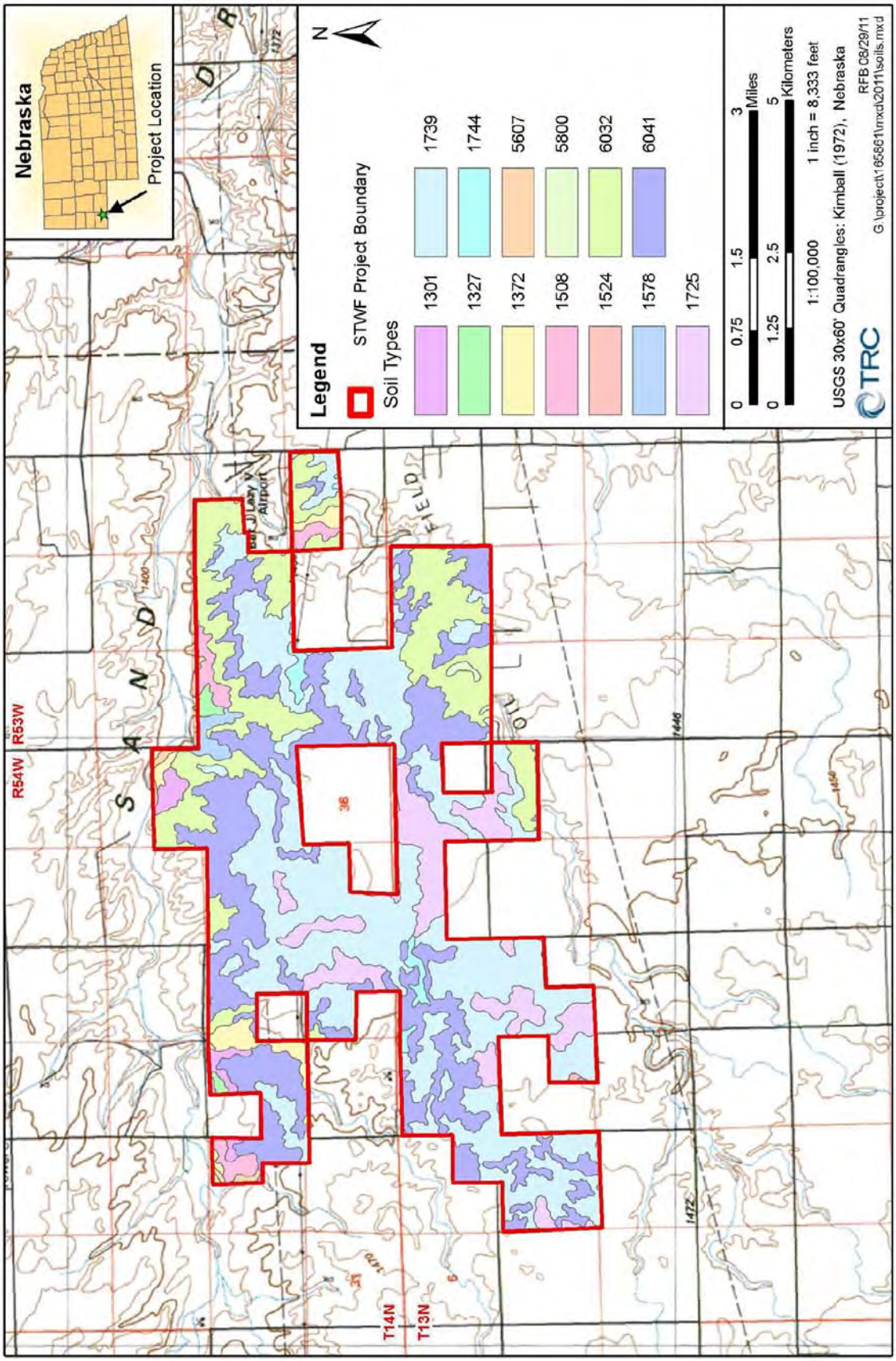


Figure 3.2 Soil Types, STWF Project Area.

facilities, but overall drainage patterns would be preserved. As such, impacts to stream channel morphology would be minor for the 30-year life of project.

Geologic Hazards. No geologic features that could cause structure failures are known to occur in the project area. In addition, GEI's Proposed Action would not create any geological hazard or areas of instability.

Mineral Resources. Oil and gas extraction or gas pipelines would not be interrupted or impacted during the construction period. Project facilities were designed to avoid pipelines by 400 ft and oil and gas wells by 110% of the maximum height of the wind turbine. Therefore, GEI's Proposed Action would not impact any mineral resources.

Paleontology. Direct impacts to fossils could include the inadvertent destruction of scientifically important fossils during excavation. The loss of scientifically important fossils would be an adverse effect. Overall, however, because the project footprint is quite small (about 259.9 acres of initial disturbance) and no fossils were discovered during the field reconnaissance, the potential for loss of important fossils is low. However, because the Miocene-aged Ogallala Formation is well known for yielding important vertebrate fossils, monitoring during construction or any other ground-disturbing activities that would disturb bedrock by STW or its contractors would be conducted by a trained paleontologist. Indirect impacts to paleontologic resources could occur from the loss of important fossil materials due to private collection or vandalism of newly exposed areas. Employee education about the value of these resources would minimize any indirect effects. Beneficial impacts could result from the discovery and analysis of fossils during project implementation.

Soils. Approximately 259.9 acres of soils would be impacted during initial construction, and approximately 54.1 acres would remain for roads, turbines, and facilities for the 30-year life of project. Approximately 6,187 acres of the project area are currently cultivated and disturbed annually as they are tilled and used for agricultural production. Impacts to soils due to the project would be either minor and temporary or minor and long-term (in project footprint). Impacts would include soil loss through erosion, compaction, and loss of structure in soils that

are disturbed or driven on during construction. All surface-disturbed or compacted areas not needed for operation would be regraded, loosened, and revegetated in accordance with landowner wishes or easement agreements. Long-term impacts would occur where facilities are installed (e.g., along new roads and at tower sites). To minimize impacts to soil, STW would develop and implement a SWPPP along with other mitigation measures specified in Chapter 2.0. Since the overall footprint of the project is small relative to the size of the project area and an SWPPP would be implemented, impacts to soils would be minimal. No unique soils occur in the project area known to sustain sensitive plant species. Thirty-three (83%) of the turbines would be located on cropland, five (12%) turbines would be located on native grassland, and the remaining two turbines (5%) would be located on CRP, which is common in this part of Nebraska.

O&M Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the O&M phase of this project. Impacts to soils during the O&M phase of the project would largely be associated with limited soil erosion induced by vehicle traffic on existing roads; however, soil erosion from this source is expected to be minor. STW would continue to implement the SWPPP for this project and would monitor and repair any areas of erosion or soil instability.

Decommissioning Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. Soil erosion and some compaction are the primary impacts that would be expected from removal of roads, turbines, and other structures. Control of surface runoff and sedimentation during the decommissioning phase of the project would be accomplished by the continued implementation of the SWPPP and other mitigation measures specified in Chapter 2.0 of this EA and would generally reduce the impact to soils. After final reclamation operations have been successfully completed, soil stability would likely be achieved, and the rate of erosion would return to predisturbance levels. Reclaimed areas

would be considered stable if there are no large rills or gullies, no slumping or subsidence, no substantial soil movement, no headcutting in drainages, and no slope instability that can be attributed to construction, O&M, and after decommissioning of the project.

3.2.2.3 Impacts of the No Action Alternative

No impacts to geology or mineral resources would occur under the No Action Alternative. No impacts to the project from geologic hazards would occur. Impacts to paleontology and soils would continue at pre-existing levels due to agricultural activities.

3.2.2.4 GEI's Mitigation Measures

No additional mitigation, above and beyond the practices listed in Section 2.2.15 are proposed.

3.3 WATER RESOURCES

3.3.1 Environmental Setting for the Proposed Project

3.3.1.1 Surface Water Resources

Sand Draw is the major drainage that crosses the northern portion of the project area (Figure 3.3). Sand Draw is a tributary of the Sidney Draw (Hydrologic Unit Code 10190017), which encompasses an approximately 464,681-acre drainage area. Sand Draw is an ephemeral stream that flows only in response to precipitation.

The Sand Draw channel is not well defined throughout most of the project area and is characterized by a discontinuous ordinary high-water mark and a meandering swale. Areas of scour are primarily present at road crossings where flows are constricted to culverts.

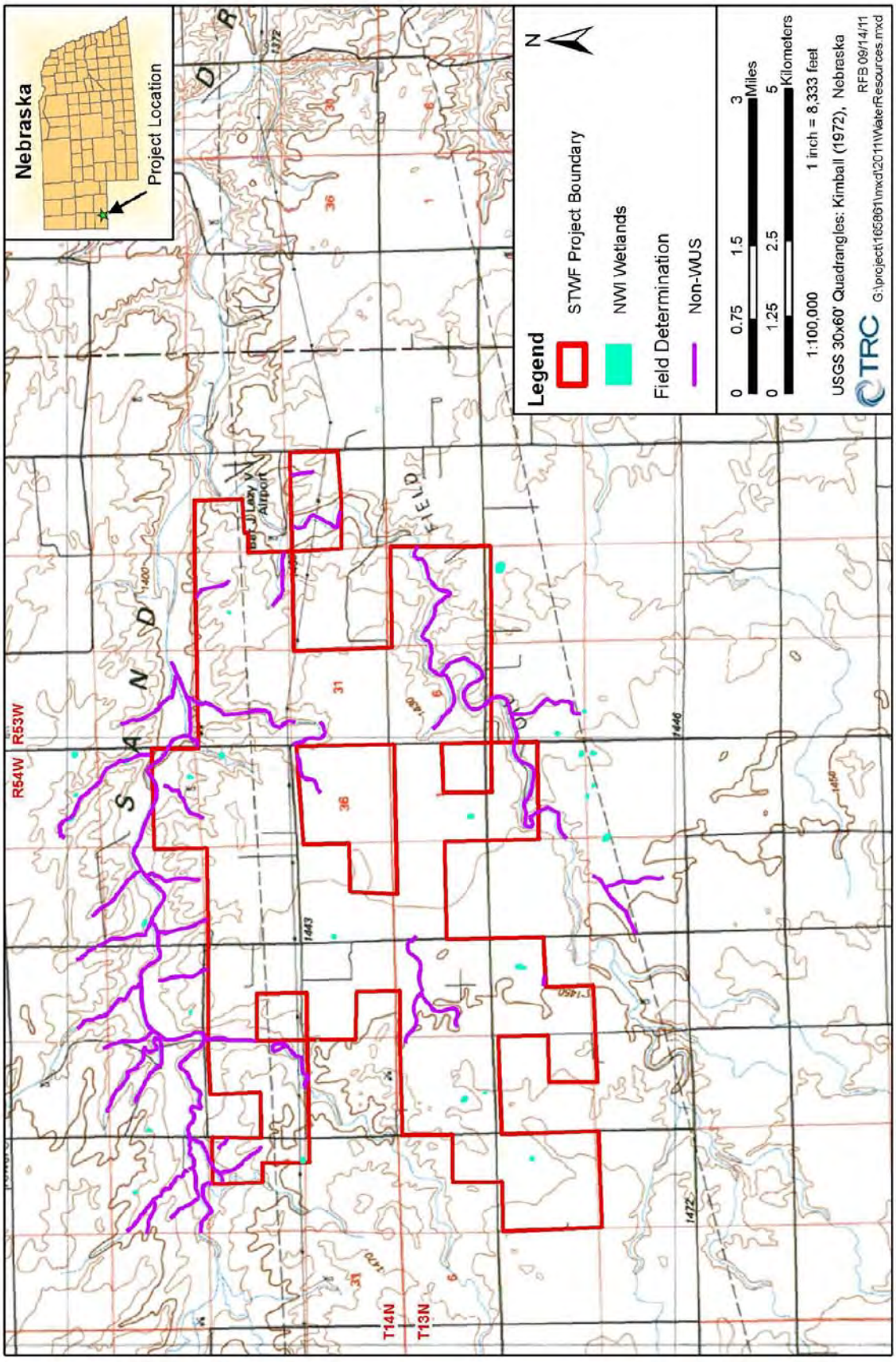


Figure 3.3 Surface Water and National Wetland Inventory (NWI) Wetlands, STWF Project Area.

No springs occur within the project area. Drainage from the east boundary of the project area flows into Lodge Pole Creek, an intermittent surface/subsurface flowing stream, located approximately 20 mi northeast near Sidney, Nebraska.

3.3.1.2 Groundwater Resources

Groundwater in the project area is confined in the High Plains Aquifer. The High Plains Aquifer primarily consists of unconsolidated sand and gravel of the Ogallala Formation and underlies an area of approximately 174,000 mi^2 in parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming. The depth to water in the High Plains Aquifer is less than 100 ft in about half of the area of the aquifer and less than 200 ft in most of Nebraska and Kansas (USGS 2011). Recharge to the High Plains Aquifer is primarily by infiltration of precipitation and locally by infiltration from streams and canals. Depth to groundwater in the STWF project area is about 300 ft (personal communication, August 18, 2011, with Mitch Daum, landowner). No groundwater is used for irrigation in the project area; however, several pivot irrigation systems occur both north and south of the STWF project area. Water withdrawn from the High Plains Aquifer in the project area is limited to domestic and livestock watering use by a few scattered farmsteads and domestic use at the U.S. Air Force missile command center.

3.3.2 Environmental Impacts and Mitigation Measures

3.3.2.1 Impacts of Western's Proposed Action

No surface or ground water would be required for Western's Proposed Action; therefore, there would be no impacts to surface or groundwater.

3.3.2.2 Impacts of GEI's Proposed Action

Construction Phase

There would be no direct impacts to surface water during construction because no permanent surface water bodies occur in the project area. In addition, STW would develop and implement a SWPPP and a SPCCP to minimize potential impacts to surface water resources.

All surface-disturbed areas not needed for operations would be restored to the approximate original contour, and pre-existing drainage patterns would be preserved so the quantity and quality of discharges from ephemeral streams and swales would not be modified. In areas occupied by permanent facilities, surface runoff would be routed around the facility so that drainage patterns would be preserved. Permanent facilities would not be located in stream channels. If stream channels are crossed by access roads, appropriately sized culverts would be installed to maintain channel flows and protect channel morphology. Surface drainage patterns and intermittent stream channel morphology would not be altered.

Depth to bedrock in the project area ranges from 0 to more than 5 ft (USDA 2011), so foundation excavation is likely to encounter bedrock. However, since water well depths in the project area range from 250 to 300 ft, foundation excavation is unlikely to encounter groundwater, and local groundwater supplies are not anticipated to be affected.

Water for concrete for foundations and for dust control would come from off-site existing municipal or private sources (see Section 2.2.13), which may derive from surface water, groundwater, or a combination of the two. The project would result in the consumption of approximately 26.5 acre-ft per year of surface and/or groundwater, but is not expected to infringe on existing water rights or to cause undue depletion of these sources. Impacts to water resources during construction would be minimal, and the project would be in compliance with the *Clean Water Act*.

O&M Phase

No impacts to surface water beyond those discussed under construction are expected during the O&M phase of this project. One well would be installed at the O&M building for minor sanitation and operational purposes for the on-site O&M personnel. The limited quantity required for O&M over the duration of the project is not expected to infringe on existing water rights or contribute to large withdrawals from or groundwater quality degradation of the High Plains Aquifer. In addition, STW would continue to implement the SWPPP and SPCCP.

Decommissioning Phase

No additional impacts beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project.

3.3.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, no additional impacts to surface or groundwater would occur beyond the impacts that currently exist.

3.3.2.4 GEI's Mitigation Measures

A SWPPP would be developed and implemented over the life of GEI's Proposed Action to minimize and prevent impacts to water resources. Erosion control measures including diversions, riprap, matting, sediment traps, and timely revegetation of all surface-disturbed areas would minimize runoff-related sedimentation impacts. Culverts would be equipped with erosion-control structures such as catch basins, ditches, or rock aprons, and these structures would be cleaned and maintained for the life of project. To reduce the potential for contamination of water due to inadvertent spills, STW would prepare and implement a SPCCP as required by EPA. If needed, pesticide/herbicide use would be limited to nonpersistent immobile pesticides/herbicide and applied in accordance with manufacture directions.

3.4 FLOODPLAINS, WETLANDS, AND WUS

3.4.1 Environmental Setting for the Proposed Project

Sand Draw is the major drainage that crosses the northern portion of the project area (refer to Figure 3.3). No floodplains occur adjacent to Sand Draw in the project area (TRC Environmental Corporation [TRC] 2009a). Several other ephemeral streams, as indicated on the U.S. Geological Survey (USGS) maps, are located in the project area. Many of these streams have been farmed across and occur in cropland, and the remaining are vegetated swales with no defined bed or bank. A wetland delineation of the entire project area was conducted in 2009 (TRC 2009a), and the U.S. Army Corps of Engineers (Corps) determined that no jurisdictional WUS are located within the STWF project area (Appendix B).

The NWI maps indicate scattered palustrine wetlands--palustrine emergent (PEMA, PEMAh, and PEMC) and palustrine unconsolidated and consolidated bank (PUBFx and PUSAh)--occur in the project area (refer to Figure 3.3). PEMA and PUSAh NWI wetlands were the two most-identified NWI wetlands in the project area. Many of the NWI wetlands have been farmed through and no longer exist as wetlands. Based on a formal wetland delineation conducted of NWI-identified wetlands in the project area in 2009, no wetlands occur within the project area (TRC 2009a).

3.4.2 Environmental Impacts and Mitigation Measures

3.4.2.1 Impacts of Western's Proposed Action

There would be no surface disturbance associated with Western's Proposed Action; therefore, there would be no impact to floodplains, wetlands, and WUS.

3.4.2.2 Impacts of GEI's Proposed Action

Construction Phase

Since no floodplains, WUS, or wetlands occur within the project area, these resources would not be impacted during the construction phase of the project. STW would use best management practices described in Section 2.2.15, including the implementation of the SWPPP to prevent sedimentation in downstream resources.

O&M Phase

Since no floodplains, WUS, or wetlands occur within the project area, these resources would not be impacted during the O&M phase of the project. STW would continue to use best management practices described in Section 2.1.15, including the implementation of the SWPPP to prevent sedimentation in downstream water resources.

Decommissioning Phase

Since no floodplains, WUS, or wetlands occur within the project area, these resources would not be impacted during the O&M phase of the project. STW would continue to use best management practices described in Section 2.1.15, including the implementation of the SWPPP to prevent sedimentation in downstream water resources.

3.4.2.3 Impacts of the No Action Alternative

No impacts to floodplains, WUS, or wetlands would occur under the No Action Alternative, except for those that currently exist.

3.4.2.4 GEI's Mitigation Measures

STW would implement mitigation measures identified in Section 2.2.15, including the development and implementation of a SWPPP over the life of GEI's Proposed Action.

3.5 VEGETATION (INCLUDING NOXIOUS WEEDS)

3.5.1 Environmental Setting for the Proposed Project

Vegetation in the project area is a mosaic of cultivated farmland (6,187 acres or 57% of the project area), rangeland (3,541 acres [32%]), CRP land (1,555 acres [10%]), and shelterbelts that are scattered throughout the project area (Figure 3.4). Kimball County is one of Nebraska's largest wheat producers; therefore, the principal crop in the project area is winter wheat. Other important crops produced include oats, millet, alfalfa, corn, and sorghum (USDA 2005). Some areas are interseeded and used for hay and/or pasture for livestock. During the 1980s, over one-quarter of the county's agricultural land was retired from annual crops and planted to grass and enrolled in the CRP. CRP land typically contains a mixture of tall and short grasses such as smooth brome, wheatgrass, and blue and sideoats grama and forbs such as mustards, pigweed, annual sunflower, and yellow sweetclover. CRP land may be grazed by livestock or returned to crop production when the CRP contract expires, unless the CRP is extended and these areas are re-enrolled. Native rangeland vegetation is typical of shortgrass prairie, with species such as blue grama, fringed sage, buffalograss, western wheatgrass, yucca, broom snakeweed, sideoats grama, Indian ricegrass, needle-and-thread, three-awn, and sand dropseed. No large populations of noxious weeks were observed in the project area. Many farmsteads and abandoned farm sites have an adjacent shelterbelt of trees and shrubs. Trees and shrubs planted in the shelter belts include eastern red cedar, Siberian elm, chokecherry, Siberian pea, cottoneaster, and, to a lesser extent, cottonwood. Most of the shelterbelts on abandoned farmsteads contain mature, over grown and decadent trees.

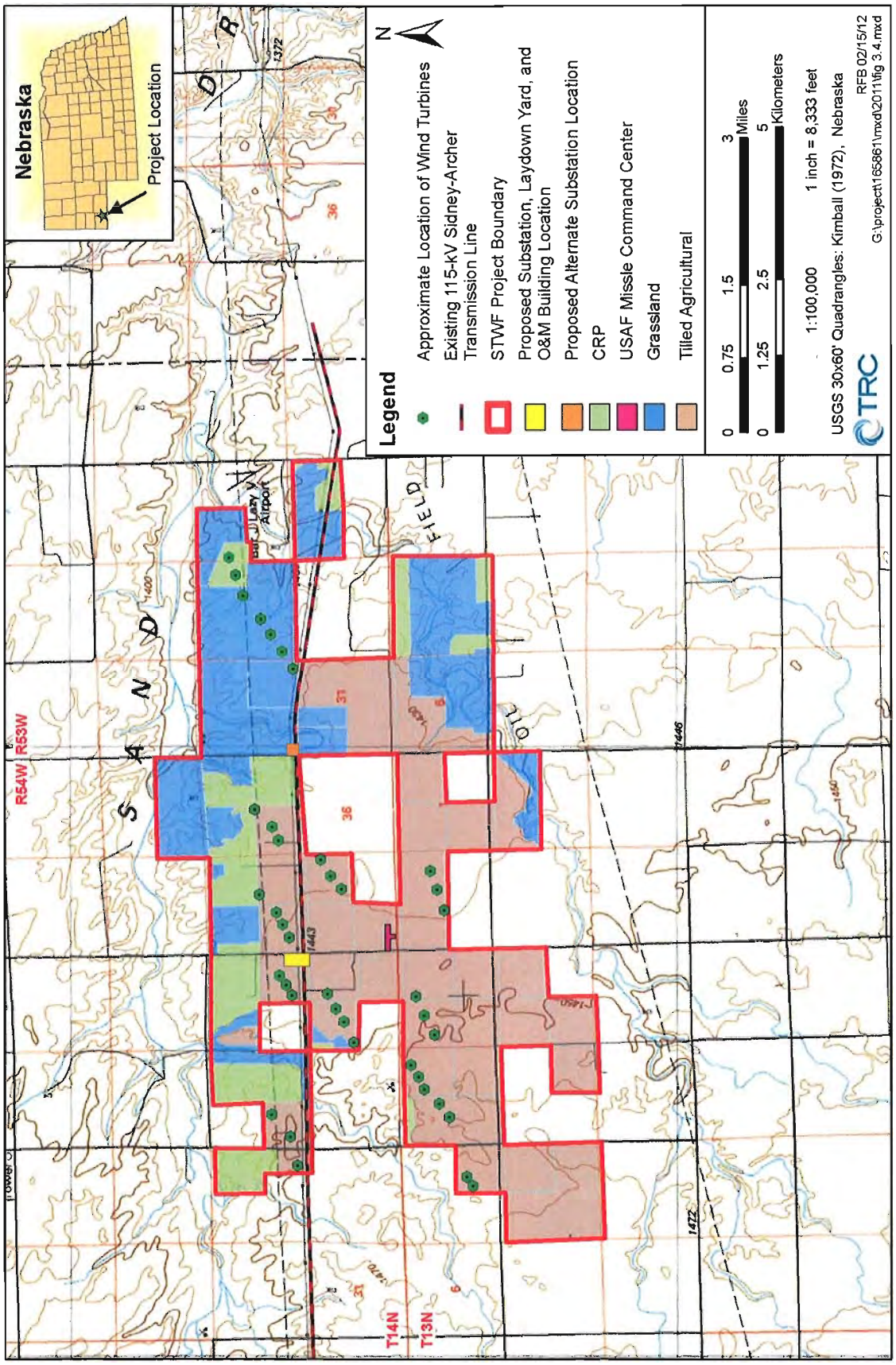


Figure 3.4 Vegetation Composition and Land Use of the STWF Project Area.

3.5.2 Environmental Impacts and Mitigation Measures

3.5.2.1 Impacts of Western's Proposed Action

No vegetation would be removed and no surface disturbing activities would occur under Western's Proposed Action; therefore, no impacts to vegetation or introduction of weeds would occur.

3.5.2.2 Impacts of GEI's Proposed Action

Construction Phase

Direct impacts to vegetation would include initial disturbance of 259.9 acres during construction (refer to Table 2.1). Of which, 1.8 acres of CRP land, 5.9 acres of rangeland, and 50.4 acres of cropland would be disturbed during turbine installation and substation construction. The remaining 201.8 acres of disturbances for roads and collector lines would occur on a combination of these land use types.

Most of the disturbed area would be reclaimed and revegetated immediately after the completion of construction, with 54.1 acres remaining occupied by roads, turbine foundations, and facilities for the life of project. Since the project footprint would be relatively small compared with the overall size of the project area and much of the area is tilled annually for agricultural production, these direct impacts would be minimal. Weed infestations constitute a potential adverse effect, but STW would take measures (e.g., conducting reclamation as soon as possible after construction operations are completed, using certified weed-free reclamation materials, washing vehicles before they enter the project area, and if weeds become established, STW would us a licensed contractor to apply any herbicides) so that impacts from weeds are anticipated to be minimal.

O&M Phase

No additional impacts beyond those discussed under the construction phase are expected to occur during the O&M phase of this project. O&M personnel would continue to implement appropriate weed control efforts in cooperation with the Kimball County Board of Weed and Pest Control.

Decommissioning Phase

No additional impacts beyond those discussed under the construction phase are expected to occur during the decommissioning phase of this project. With implementation of the project mitigation measures described in Section 2.2.15, impacts to vegetation after the decommissioning phase of GEI's Proposed Action is complete would be minimal.

3.5.2.3 Impacts of the No Action Alternative

No impacts to vegetation would occur under the No Action Alternative beyond those that already exist.

3.5.2.4 GEI's Mitigation Measures

STW would implement mitigation measures identified in Section 2.2.15. These measures include the rapid reclamation of surface-disturbed areas, not needed for the operation of the project, with certified weed-free reclamation materials. STW would limit the spread of weeds by washing equipment before bringing it on-site, and if weeds spread due to the project, STW would implement a weed control program in conjunction with the landowners and lease agreements and in cooperation with the Kimball County Board of Weed and Pest Control.

3.6 WILDLIFE

3.6.1 Environmental Setting of the Proposed Project

3.6.1.1 Mammals (Including Big Game)

The project area provides habitat for a variety of wildlife species typical of agricultural lands and native rangeland/shortgrass prairie in southwestern Nebraska. Pronghorn antelope and mule deer are the two big game species that occur in the STWF project area. White-tailed deer may pass through the project area; however, they are not likely to inhabit the area because no riparian habitat, their preferred habitat, occurs in the project area.

The STWF project area occurs in the pronghorn antelope Banner South Management Unit (BSMU). An estimated 1,000 pronghorn presently occupy the BSMU (personal communication, August 9, 2011, Kit Hams, Big Game Program Manager, NG&PC). No crucial winter range is designated in the STWF project area; however, the preferred winter and yearlong habitat for pronghorn is wheat fields. The BSMU is estimated to be composed of approximately 35% grassland and 65% cropland, primarily as winter wheat. Pronghorn antelope density is estimated at 1.5-2.0 pronghorns per square mile. Pronghorn have been known to migrate from Colorado to the southern panhandle of Nebraska; however, no migratory corridors have been mapped or studied (personal communication, August 11, 2011, with Dustin Darvaeu, Wildlife Biologist, NG&PC).

Kimball County has the lowest density of mule deer in the state of Nebraska, primary because of the lack of broken shrub habitat (personal communication, August 9, 2011, with Kit Hams, Big Game Program Manager, NG&PC). Mule deer in the STWF project area belong to the Upper Platte Management Unit. Mule deer population density in Kimball County is estimated at 1 mule deer per square mile. Hunting is highly regulated in parts of the Upper Platte Management Unit south of I-80, with no take of male mule deer in certain hunting areas. Mule deer have been observed in the Sand Draw area along the northern boundary of the STWF project area during project-related fieldwork. No crucial winter ranges for mule deer occur in the project area

(personal communication, August 11, 2011, with Dustin Darvaeu, Wildlife Biologist, NG&PC). Based on habitat preference and geographic range, several mammal and reptile species are likely to occur in the STWF project area (personal communication, August 11, 2011, with Dustin Darvaeu, Wildlife Biologist, NG&PC) (refer to Table 3.6).

Habitat for amphibians is limited due to the lack of water resources. There are no fisheries in the area due to lack of suitable streams and/or lakes/reservoirs to support fish populations.

The only non-avian species observed in the project area during project-related fieldwork were mule deer, pronghorn antelope, black-tailed jackrabbit, eastern cottontail, red fox, thirteen-lined ground squirrel, prairie rattlesnake, bull snake and wandering garter snake (Table 3.6).

Big brown bat, little brown myotis, long-legged bat, tri-colored bat, eastern red bat, western long-eared bat, hoary bat, silver-haired bat, fringed bat, Townsend's big-eared bat, and western small-footed myotis are bat species that are known to occur or likely to occur in Kimball County (Table 3.7).

Bat species can be identified by the frequency of their calls. Therefore, two years of fall bat surveys were conducted in the STWF project area using stationary AnaBat II bat detectors to record bat calls (TRC 2010a, 2012a). Bat calls were classified as either high-frequency (HF) calls (≥40 kilohertz [kHz]) that are generally given by small bats (e.g., *Myotis* sp.), mid-frequency (MF) calls (30-40 kHz) include Eastern red bat and Western long-eared bat, or low-frequency (LF) (<30 kHz) calls that are generally given by larger bats commonly found in this area (e.g., silver- haired bat, big brown bat, or hoary bat). For those species identified as having LF calls, some detailed species information can be extracted from the acoustic surveys based on the frequency of the calls.

Bat activity was found to peak in late July and early August and decline rapidly in mid-September. Based on the results of this survey, hoary bats comprised approximately 0.7% of total passes, and eastern red bats comprised approximately 1.6% of total passes detected within the study area (TRC 2010a, 2012a).

Table 3.6 Mammals and Reptiles Potentially Occurring or Observed Within or in the Vicinity of the STWF Project Area.

Common name	Scientific name	Observed	Likely to Occur
Pronghorn antelope	*Antilocarpa americana*	X	Y
Mule deer	*Odocoileus hemionus*	X	Y
White-tailed deer	*Odocoileus virginianus*		N
Coyote	*Canis latrans*		Y
Red fox	*Vulpes vulpes*	X	Y
Swift fox	*Vulpes velox*		Y
Raccoon	*Procyon lotor*		Y
Long-tailed weasel	*Mustela frenata*		Y
American badger	*Mustela frenata*		Y
Striped skunk	*Mephitis mephitis*	X	Y
Bobcat	*Lynx rufus*		Y
Black-tailed jackrabbit	*Lepus californicus*	X	Y
Eastern cottontail	*Sylvilagus floridanus*	X	Y
Thriteen-lined ground squirrel	*Ictidomys tridecemlineatus (*formally *Spermophilus tridecemlineatus*)	X	Y
Black-tailed prarie dog	*Cynomys ludovicianus*		Y
Northern pocket gopher	*Thomomys talpoides*		Y
Plains pocket gopher	*Geomys bursarius*		Y
Silky pocket mouse	*Perognathus flavus*		Y
Hispid pocket mouse	*Chaetodipus hispidus*		Y
Ord's kangaroo rat	*Dipodomys ordii*		Y
Western harvest mouse	*Reithrodontomys megalotis*		Y
Plains harvest mouse	*Reithrodontomys montanus*		Y
Deer mouse	*Peromyscus* spp.		Y
Northern grasshopper mouse	*Onychomys leucogaster*		Y
Prairie vole	*Microtus ochrogaster*		Y
Meadow vole	*Microtus pennsylvanicus*		Y
Wandering garter snake	*Thamnophis elegans vagrans*	X	Y
Prairie rattlesnake	*Crotalus viridis*	X	Y
Bull snake	*Pituophis catenifer sayi*	X	Y

Table 3.7 Bat Species Likely to Occur Within the STWF Project Area, as Determined from Range Maps (Harvey et al. 1999; Bat Conservation International, Inc. ([BCI] 2011), Sorted by Call Frequency.

Common Name	Scientific Name
High-frequency (>40 kHz)	
Western small-footed bat	*Myotis ciliolabrum*
Little brown bat[1]	*Myotis lucifugus*
Long-legged bat[1, 2]	*Myotis volans*
Tri-colored bat[1, 2]	*Perimyotis subflavus*
Mid-frequency (30-40 kHz)	
Eastern red bat[1, 2, 3]	*Lasiurus borealis*
Western long-eared bat[1, 2]	*Myotis evotis*
Low-frequency (<30 kHz)	
Townsend's big-eared bat[2]	*Corynorhinus townsendii*
Big brown bat[2, 3]	*Eptesicus fuscus*
Silver-haired bat[2, 3]	*Lasionycteris noctivagans*
Hoary bat[2, 3]	*Lasiurus cinereus*
Fringed bat[2]	*Myotis thysanodes*

[1] Known casualty from wind turbines.
[2] Species distribution on edge or just outside project area.
[3] Long-distance migrant.

No winter hibernacula or bat roosts are known to occur in the area; however, limited roosting habitat does occur in the project area and includes trees, rock ledges, and other structures (e.g., barns) in the project area.

3.6.1.2 Birds (Including Raptors and Passerines)

Seventy-one avian species were recorded during the course of two years of preconstruction spring and fall avian studies conducted in 2009 and 2011 (Table 3.8) (TRC 2010b, 2012b,). Additional species unrecorded during weekly spring and fall surveys are likely to occur as migrants and occasional visitors in the STWF project area. The project is located on the

Table 3.8 Species Recorded Within the STWF Project Area and Vicinity During 2009 and 2011 Preconstruction Avian Monitoring Studies.[1]

Common Name	Scientific Name
American crow	*Corvus brachyrhynchos*
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
Barn swallow	*Hirundo rustica*
Black-billed magpie	*Pica hudsonia*
Brown-headed cowbird	*Molothrus ater*
Blue jay	*Cyanocitta cristata*
Bobolink	*Dolichonyx oryzivoris*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's sparrow	*Spizella Breweri*
Burrowing owl	*Athene cunicularia*
Chipping sparrrow	*Spizella passerina*
Cinnamon teal	*anus cyanoptera*
Cliff swallow	*Petrochelidon pyrrhonota*
Common grackel	*Quiscalus quiscula*
Common nighthawk	*Chordeiles minor*
Cooper's hawk	*Accipiter cooperii*
Eastern bluebird	*Sialia sialis*
Eastern kingbird	*Tyrannus tyrannus*
Eurasian collared-dove	*Streptopelia decaocto*
European starling	*Sturnus vulgaris*
Ferruginous hawk	*Buteo regalis*
Field sparrow	*Spizella pusilla*
Great horned owl	*Bubo virginianus*
Golden eagle	*Aquila chrysaetos*
Grasshopper sparrow	*Ammodramus savannarum*
Unidentified gull	--
Hairy woodpecker	*Picoides villosus*
House finch	*Carpodacus mexicanus*
Horned lark	*Eremophila alpestris*
House sparrow	*Passer domesticus*
House wren	*Troglodytes aedon*
Hudsonian godwit	*Limosa haemastica*
Killdeer	*Charadrius vociferus*
Lark bunting	*Calamospiza melanocorys*
Lark sparrow	*chondestes grammacus*
Loggerhead shrike	*Lanius ludovicianus*
Mallard	*Anas platyrhynchos*
McCown's longspur	*Calcarius mccownii*
Mountain bluebird	*Sialia currucoides*
Mourning dove	*Zenaida macroura*

Table 3.8 (Continued)

Common Name	Scientific Name
Mountain plover	*Charadrius montanus*
Merlin	*Falco columbarius*
Northern flicker	*Colaptes auratus*
Northern harrier	*Circus cyaneus*
Northern mockingbird	*Mimus polyglottos*
Northern shrike	*Lanius excubitor*
Prairie falcon	*Falco mexicanus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Rough-legged hawk	*Buteo lagopus*
Ring-necked pheasant	*Phasianus colchicus*
Rock pigeon	*Columba livia*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Sandhill crane	*Grus canadensis*
Say's phoebe	*Sayornis saya*
Short-eared owl	*Asio flammeus*
Semipalmated plover	*Charadrius semipalmatus*
Sharp-tailed grouse	*Tympanuchus phasianellus*
Swainson's hawk	*Buteo swainsoni*
Townsend's warbler	*Dendroica townsendi*
Turkey vulture	*Cathartes aura*
Unidentified buteo	--
Unidentified passerine	--
Unidentified sparrow	--
Unidentified thrush	--
Unidentified warbler	--
Unidentified woodpecker	--
Upland sandpiper	*Bartramia longicauda*
Vesper's sparrow	*Pooecetes gramineus*
White-crowned sparrow	*Zonotrichia leucophrys*
Western kingbird	*Tyrannus verticalus*
Western meadowlark	*Sturnella neglecta*
Western tanager	*Piranga ludoviciana*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Yellow-rumped warbler (Audubon's)	*Dendroica coronata auduboni*

[1] TRC (2010b, 2012b).

western flank of the central flyway; however, based on the daytime point count surveys conducted in the project area, it did not appear to serve as a major migratory corridor for birds, nor did it appear to serve as a migratory stopover site. No large numbers or groups of waterfowl, shorebirds, or raptors were recorded in the STWF project area (TRC 2010b, 2012b). One group of sandhill cranes was observed once during the fall 2011 surveys in one of the agricultural fields. Several species of waterfowl were observed in temporary puddles and ponds following a heavy rainstorm. Given the lack of water in the STWF and immediate vicinity, it is expected that most migrating birds would likely utilize water courses such as the South Platte River, located approximately 60 mi southeast of the STWF project area, or the North Platte River, located about 50 mi north of the STWF project area. The nearest waterbody is the Oliver State Recreation Area located approximately 20 mi northwest of the STWF project area. The only large flocks of passerines recorded were horned larks and lark buntings during the end of the fall surveys in 2009 and 2011 where flocks of 50 to 200 birds were recorded primarily congregating in cropland (TRC 2010b, 2012b).

Although nocturnal use of the area, particularly during migration seasons, is unknown, the area's lack of typical topography used for migration (e.g., rim edges or water courses) and habitat patterns do not indicate a higher than normal use of the project area by migrating birds. Based on 2 years of preconstruction surveys, the peak number of birds, and number of species recorded, spring migration in the STWF project is from mid-April through mid- to late May, with the largest number of species occurring in mid May (TRC 2010b, 2012b). Fall migration is from mid- to late August through early October, with the largest number of species occurring the first week of September (TRC 2009b, 2012b).

Raptors (Including Golden Eagles)

The project area contains nesting and foraging habitat for several species of raptors, including Swainson's hawk, red-tailed hawk, ferruginous hawk, golden eagle, northern harrier, rough-legged hawk, American kestrel, Cooper's hawk, great horned owl, barn owl, short-eared owl, and burrowing owl (Johnsgard 2004). Field surveys for raptor nests were conducted in 2008 (TetraTech 2008), 2009 (TRC 2009b), and 2011 (TRC 2011a) in the vicinity of the STWF

project area. Thirteen raptor nests are known to occur in the vicinity of the project area (TRC 2009b, 2011a).

In 2011, eight nests were observed in the STWF project area plus a 1.0-mi buffer. Five of the 13 previously recorded nests in 2008 and 2009 were destroyed by natural causes or, in the case of borrowing owl burrows, cultivated through. Three of the eight nests were active in 2011--one golden eagle and two ferruginous hawks nests (TRC 2011a).

A total of 31 golden eagle observations were recorded during the 2009 avian use surveys (TRC 2009b). Twenty-seven golden eagle observations were recorded during the spring 2009 surveys, and four were observed during the fall 2009 avian surveys. Most (87%) of the 2009 spring observations were within 1.0 mi of the golden eagle nest.

In 2011, two additional surveys were conducted in conjunction with the weekly spring and fall avian use surveys to document golden eagle use of the project area and vicinity. In spring 2011, an inventory for golden eagle nests within a 10-mi buffer of the STWF project area was conducted (TRC 2011c). This inventory was implemented based on discussions with Western, USFWS Nebraska Ecological Service Office, and NG&PC. During this inventory, to determine prey locations for golden eagle, the locations of all prairie dog colonies within the 10-mi survey area were also recorded. Four nest areas were identified in the 10-mi survey area (TRC 2011b). Of the four nests located, three were determined to be active in 2011.

The second 2011 golden eagle study was conducted to assess the spatial and temporal use of the STWF project area (TRC 2011d; Appendix C). During the weekly spring and fall avian studies, all golden eagle observations were mapped with the general direction of flight and flight heights. Most of the golden eagle activity during the spring/early summer of 2011 was noted within a 1.0-mi radius south of the nest and up to 2.5 mi north of this nest (Figure 3.5). The exception was during the first 2011 site visit on April 12, when a single golden eagle was noted in the extreme southwest corner of the project area. Four prairie dog colonies were observed in the inventory area, all north of I-80 and located more than 4.0 mi north of the proposed STWF project area. Because most of the eagle flights patterns are north of the STWF project area, it may be

This page is intentionally left blank.

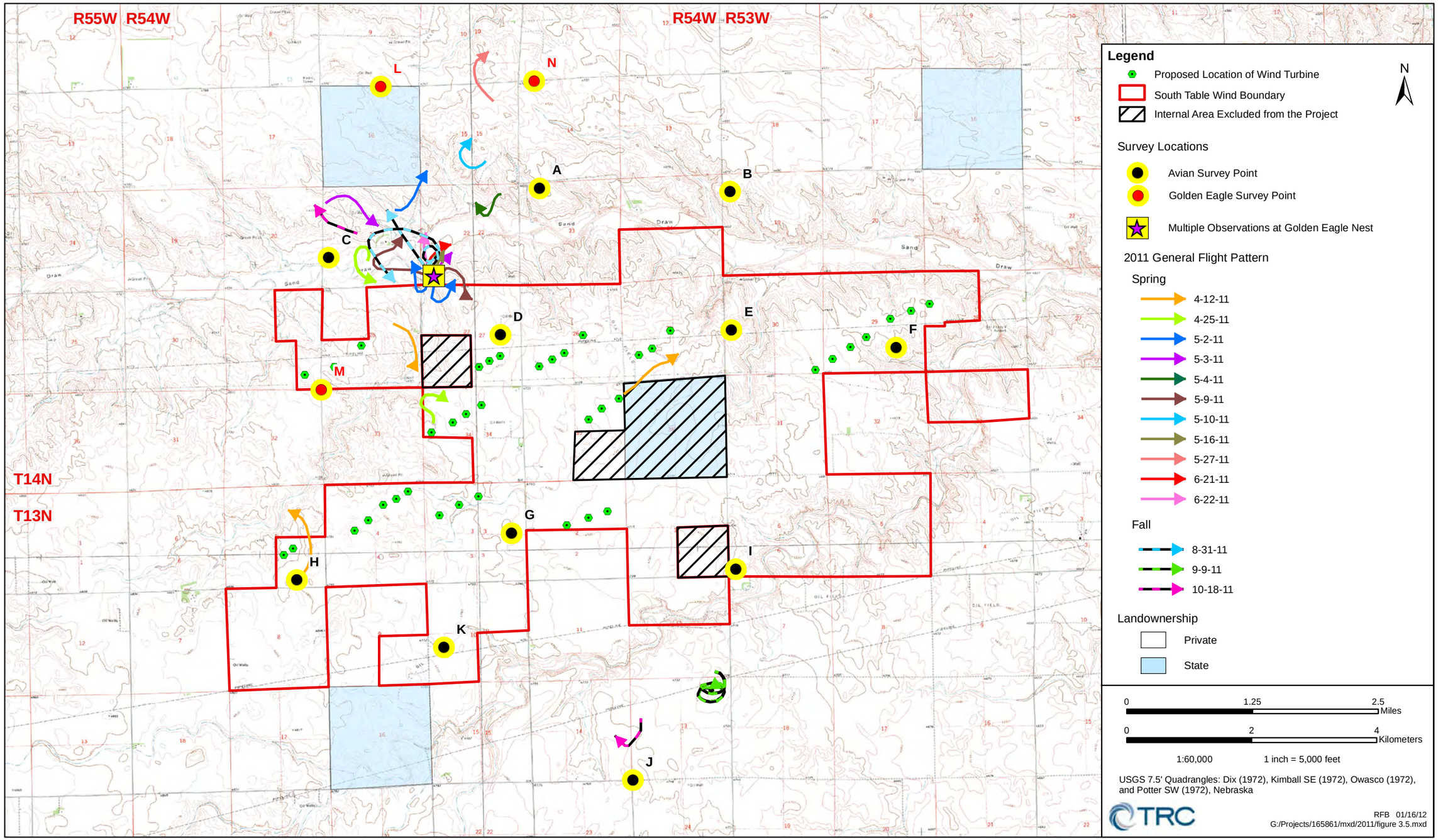


Figure 3.5 Golden Eagle Observations and Flight Patterns, 2011, STWF Project Area.

concluded that the eagles of this nest are likely utilizing these prairie dog colonies for food. One golden eagle was noted, perched on a rock overlooking one of these prairie dog colonies. No other prairie dog colonies or ground squirrel areas were observed in the project area or the 10-mi radius eagle nest inventory area (TRC 2011c).

In late summer and fall 2011, either one juvenile and/or adult golden eagle were observed during the weekly avian surveys perched at the nest cliff. This location appeared to provide a shaded roosting habitat during parts of the daytime hours. As the cliff was exposed to the hot afternoon sun, the eagle(s) abandoned the roost. As recorded in spring 2011, most flight patterns observed during the fall avian studies were generally north and outside of the STWF project area (TRC 2011b, 2011d, 2012b).

Based on 2009 (TRC 2010b) and 2011 (TRC 2011a, 2011b, 2011c, 2011d, 2012b) golden eagle observational data collected for the proposed STWF project area, eagles spatial use is concentrated in close proximity to the golden eagle nest located in SWSW Section 22, T14N, R54W. Flight height increased as distance from nest increased. Preliminary observations indicate that most golden eagle observations greater than 1.0 mi from the nest were usually soaring at heights estimated at greater than 135 meters, which is above the general rotor sweep area of a 1.5-MW turbine.

Raptor species observed during project-related fieldwork to date include golden eagle, prairie falcon, American kestrel, merlin, Cooper's hawk, northern harrier, red-tailed hawk, ferruginous hawk, rough-legged hawk, short-eared owl, great-horned owl, and burrowing owl. Northern harrier, rock pigeon, red-tailed hawk, and Swainson's hawk were the most commonly observed large birds (TRC 2010b). Mourning dove, western meadowlark, horned lark, lark buntings, loggerhead shrike, and McGown's longspur were the most recorded passerine species in the STWF project area (TRC 2010b, 2012b).

Pheasants, mourning doves, and sharp-tailed grouse were the only game birds observed in the project area during project-related fieldwork (TRC 2010b, 2012b). No known sharp-tailed grouse or greater prairie chicken leks occur in the area (personal communication, August 11,

2011, with Dustin Darvaeu, Wildlife Biologist, NG&PC); however, this area has not been extensively surveyed for leking areas. No sharp-tailed grouse or greater prairie chicken leks were observed during preconstruction avian studies or personal communication with local landowners. Mourning doves are common throughout the STWF project area regardless of season.

3.6.2 Environmental Impacts and Mitigation Measures

3.6.2.1 Impacts of Western's Proposed Action

Western's Proposed Action is limited to the interconnection to the existing Archer-Sidney transmission line. No additional structures such as power poles or additional electrical lines would be required and all electrical component necessary for the interconnection would be housed within the fenced substation area. Therefore, there would be no risk to wildlife of electrocution. No surface disturbing activities would be required under Western's Proposed Action; therefore, there would be no loss of habitat as a result of the interconnection. No impacts to wildlife, including bats and birds would ocurr under Western's proposed Action.

3.6.2.2 Impacts of GEI's Proposed Action

Construction Phase

Mammals (Including Big Game)

Impacts to wildlife species during the construction phase of the Proposed Action would include disturbance of foraging, nesting, brood rearing, and winter habitats; displacement from portions of the project area due to human presence, fugitive dust, or noise; loss of habitat by alteration and/or fragmentation; and direct mortality due to collisions with vehicles (Bureau of Land Management [BLM] 2005; Arnett et al. 2007; and National Research Council 2007). Construction location and timing may also affect migratory and other behavioral activities of some species of wildlife and big game. It is also possible that big game could be struck by

construction vehicles; however, posted speed limit signs would be installed on project roads in cooperation with Kimball County officials, and mortalities due to vehicular collisions should be minimal. Initial direct removal of wildlife habitat would include 259.9 acres (2.3% of the project area), and approximately 205.8 acres would be reclaimed after construction operations have been completed. Approximately 54.1 acres of wildlife habitat (0.5% of the project area) would be unavailable over the life of the project.

Impacts to big game are expected to be minimal because the land is primarily agricultural and is subject to regular human activity from farming and ranching activities. Since the overall footprint of the project would be small relative to the size of the project area (2.3%), loss of forage would be negligible. Natural forage distribution has already been substantially altered by agricultural activities where crops provide abundant forage and fallow areas do not, and the footprint of the wind project likely would be unnoticeable within this larger agricultural management system.

Since the direct footprint of the project (i.e., 54.1 acres; 0.5% of the project area) would be small compared to the size of the project area, loss of forage would be minimal. However, the existing habitat within the footprint of the project, including wind turbines, access roads, and support facilities, would be disturbed, and habitat fragmentation would increase. To minimize habitat fragmentation, STW would use and upgrade as many of the existing access and two-track roads as possible. Reclamation and initial revegetation efforts of the temporarily disturbed areas would reduce the extent of habitat loss, but these effects would likely persist for 2 to 5 years after construction until revegetation of grasses and forbs is established.

The effects of habitat alteration on big game due to construction of wind energy developments are mostly unknown (Natural Resource Council 2007). No studies have been conducted in Nebraska on impacts to big game during the construction of wind projects. No detectable changes in pronghorn antelope abundance occurred at the Arlington, Wyoming, wind project after construction (Johnson et al. 2000), so pronghorn may habituate to human activity and construction operations. Mule deer also are fairly tolerant of human activities (Reed 1981; Irby et al. 1988), and there is already frequent human presence due to farming and ranching activities,

so it is likely that any displacement would likely be temporary and the effects would be minimal. No crucial winter range or known birthing areas occur on-site, so big game critical habitats would not be affected.

Construction noise may also be an impact to wildlife in the STWF project area (National Research Council 2007). Noise sources during construction could include heavy trucks and equipment operation. Human presence during construction activities may also temporarily displace wildlife species that may be present within or near construction areas. The duration and distance an animal is displaced depend on the individual species, and an individual's response to disturbance may change over time (BLM 2005; Arnett et al. 2005; National Research Council 2007). Potential noise impacts would be mitigated by STW, ensuring that all equipment is operated with the appropriate muffles or other noise control devices.

Direct impacts from mortality or injury to smaller less-mobile species (e.g., small mammals) could occur during construction if those species are present. These impacts are expected to be low and of short duration (BLM 2005; National Research Council 2007). Most of these wildlife species would likely move away from the construction activities to undeveloped areas located outside of the disturbed area. Some species such as burrowing rodents would be vulnerable to mortality from the physical disruption of soils and vegetation or displacement. However, these impacts would be limited to the 259.9 acres of disturbance and would not result in population level impacts.

Assuming appropriate design features are implemented, erosion and sedimentation, contaminant exposure, and fugitive dust from construction of the STWF facility would have minimal impacts on mammals. Because there are no perennial waters in the project area and water erosion and sedimentation would be avoided through the implementation of appropriate protective measures (i.e., the SWPPP), impacts to wildlife from a decrease in water quality would be minor. Fugitive dust would also be minimized through the implementation of appropriate dust abatement measures, and impacts to wildlife would be minor. Contaminants within the project area would be contained, and any impacts to wildlife from contaminants would be short-term, localized, and minimized by implementation of appropriate measures (i.e., SPCCP). Introduction of invasive

vegetation may reduce habitat quality and locally affect wildlife occurrence and abundance. These potential impacts would be minimized through the implementation of appropriate design features to manage nonnative invasive species as outlined in Chapter 2.0.

The construction phase of GEI's Proposed Action is expected to have minimal impacts on resident and migrant bat species that may occur in the STWF project area. The primary impact to bats during the construction phase is from collision-related mortality with the turbines prior to operation or into towers (BLM 2005; National Research Council 2007). Since bats are not known to roost in the area, impacts to bats during the construction phase are expected to be low. In addition, the STWF project area does not contain topographic features likely to funnel or provide roosting areas for migrating bats, and the project area lacks large tracts of forest cover, open water, or other suitable foraging areas. Based on the topography of the STWF project area, it is expected that a majority of bat mortalities during the construction phase of the project would occur as individuals migrate through the area. While it is possible that bats could fly into construction equipment and the turbines prior to operation, it is anticipated that bat mortality would be minimal during the construction phase of the project.

Raptors and Other Migratory Birds

Impacts to birds during the construction phase would be similar to those discussed for wildlife with habitat loss and fragmentation due to vegetation disturbance, human presence, and noise. Additional impacts during the construction phase to raptors and other birds may be collisions with construction vehicles, turbines, met towers, and substation structures (BLM 2005; National Research Council 2007; Arnett et al. 2007).

The *Migratory Bird Treaty Act* provides protection to most birds found in or migrating through the project area. Impacts to migratory species could result from the removal of vegetation (clearing, etc.) during site preparation or from compaction of vegetation. The removal of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during construction.

Raptors could be impacted as a result of construction-related disturbance during the nesting season (February 1-July 31). To minimize potential impacts to raptors, STW has established seasonal no surface occupancy restriction areas in regards to raptor nests when siting turbines and project related facilities. No turbines would be placed within 1.0 mi of golden eagle or ferruginous hawk nests, 0.25 mi of Swainson's or red-tailed hawk nests, and 150 ft from burrowing owl nest burrows. These buffers were based on recommended setbacks used for the Peetz Wind project located approximately 10.0 mi south of the proposed STWF project area (Western 2005) and recommended for other wind energy projects in the region.

To reduce the risk of electrocution to bird species, all electrical systems and components would be underground.

O&M Phase

Mammals (Including Big Game)

Impacts to wildlife (including big game) during the O&M phase of the STWF Project would result from the loss of forage by an avoidance suitable habitat within the project area due to vehicle traffic and project related noise, increased wildfire potential, and collision with STW Project vehicles. During the O&M phase, turbine assembly areas would be reduced and revegetated to a 40 x 40-ft pad area, and road widths would be reduced and revegetated from 50 ft to approximately 16 ft. Trenches for collection and communications lines would be backfilled and revegetated. These temporarily disturbed areas would be primarily located adjacent to roads that would be utilized by O&M personnel. Temporary disturbance areas would be reclaimed and revegetated and allowed to return to its previous use as wildlife habitat. The timing of seeding operations would typically occur during the fall, but some reseeding efforts may occur during the spring.

The wind turbines identified for this project are expected to have a maximum sound power level less than 104 dBA (General Electric 2004). According to the Wind Energy Programmatic Environmental Impact Statement (PEIS) (BLM 2005), a wind turbine with a sound power level

of 104 dBA would have a resulting sound power level of 58 to 62 dBA at a distance of 164 ft from the turbine, which is about the same level as conversational speech at a distance of about 3 ft. This level of noise could disturb foraging and reproductive behaviors of various wildlife species that could lead to habitat avoidance (BLM 2005). However, it is unclear what impact this level of noise from wind turbines might have on wildlife species, including big game., because to date, few wildlife studies related to noise impacts of wind energy projects have been conducted (BLM 2005). It should also be noted that as wind speeds increase, background noise levels (from the wind) would also increase and would be louder than the operating wind turbine (BLM 2005; Rogers et al. 2006).

Disruption and/or displacement during the O&M phase of the project would likely be a continuation of construction-related impacts discussed above. However, the level of human activity during the O&M phase would be much less than during the construction phase of GEI's Proposed Action. A study of pronghorn antelope at the Foote Creek Rim wind project in south-central Wyoming indicate that no substantial change in pronghorn abundance in the immediate project area (Johnson et al. 2000).

No linear fences that could interfere with movement of big game species would be installed as part of GEI's Proposed Action, and fences would only be installed around individual structures such as the electrical substation and O&M facility to protect public health and safety and to protect the company's assets.

The exact causes of bat mortality due to the operation of wind turbines are relatively unknown, and studies are ongoing (Kunz et al. 2007). Barotrauma, rather than collision with turbines, is suspected as a major cause of bat fatalities at wind energy facilities. Barotrauma involves tissue damage to bat lungs cause by rapid air pressure changes near turbine blades. One study found that 90% of bat fatalities at a wind facility involved internal hemorrhaging consistent with barotrauma (Baerwald et al. 2008). Currently, mortality surveys are the only source of information on the number of bat fatalities at wind energy facilities. To date, only a limited number of post-construction monitoring studies have been conducted at wind energy projects in the western U.S., and the results of these studies suggest: 1) migratory species with LF calls

(e.g., hoary and silver-haired bats) comprise almost 75% of reported bats killed; 2) the majority of bat fatalities occur during the postbreeding or fall migration season (roughly August and September); and 3) the highest reported fatalities occur at wind facilities located along forested ridgetops (Johnson et al. 2003; Kunz et al. 2007), although recent studies in agricultural regions of Iowa and Alberta, Canada, report relatively high fatalities as well (Baerwald 2006).

It is estimated that the large majority of bat fatalities at wind energy facilities involve solitary, migratory, and foliage- and tree-roosting species such as silver-haired, hoary, and red bats. Hoary bats account for nearly half of all bat fatalities at wind energy facilities (Arnett et al. 2007; Kunz et al. 2007; Erickson et al. 2002; Johnson et al. 2003; Johnson 2005; Young et al. 2004). Although variable and periodic, bat fatalities consistently peak in late summer and fall, coinciding with migration (Arnett et al. 2007). Approximately 90% of fatalities occur from mid-July through late September, with over 50% occurring in August (Erickson et al. 2002; Johnson 2004; Johnson 2005). Mortality during the breeding season is low. One study showed that, although there were relatively large breeding populations of bats near an operating wind facility, bat collision mortality was low to nonexistent (Johnson 2004). Mortality during spring migration is also very low (Johnson 2005). Only a small fraction of bats that traverse wind energy facilities are actually impacted by wind turbines (Erickson et al. 2002; Johnson 2005). These data suggest that wind energy facilities do not currently affect resident breeding or foraging bat populations (Erickson et al. 2002; Johnson et al. 2003; Johnson 2004; Johnson 2005). Studies indicate that bat mortality rates were the highest in forested environments, moderate in open areas close to forests, and lowest in open areas (Johnson 2005).

There are no available data regarding bat mortality at the existing Peetz Table Wind Project located 10.0 mi south of the proposed STWF Project (personal communication via email, August 23, 2011, with Sandy Vana-Miller, USFWS, Colorado Field Office); however, one post-construction study was conducted in 2006-2007 on a portion of the project, known as the Spring Canyon Project. The Spring Canyon Wind Project (SCWP) is a 60-MW facility located in Logan County, Colorado, east of Peetz. The post-construction mortality survey was conducted at 20 of the 40 operating turbines, and 14 bats were found between September 2006 and August 2007 at SCWP. Hoary bat was the only bat species found in the 20 turbine fatality search plots.

The study estimated bat fatality at 0.7 bats per turbine (TRC 2008). All of the hoary bat carcasses were found during the fall migration period.

Bat activity at the STWF project area was estimated as a mean = 6.2 bat passes per detector-night during the acoustic AnaBat studies in 2009 and 5.8 bat passes per detector-night in 2011 (Table 3.9) (TRC 2010a, 2012a). The use was higher than that observed during preconstruction studies at other wind energy facilities such as the Foote Creek Rim project area in south-central Wyoming and the Buffalo ridge site in Minnesota. Documented bat mortalities during post-construction studies were low for both of these facilities (Table 3.9). Bat activity at the STWF project area is much lower than activity recorded at sites in West Virginia, Tennessee, and Iowa where bat mortality rates were much higher (see Table 3.9).

Therefore, based on the presumed relationship between preconstruction bat activity and post-construction fatalities, the overall bat mortality rates in the STWF project area is estimated to be between 0.7 and 10 bat fatalities/turbine/year.

Table 3.9 Wind Energy Facilities in the U.S. with Preconstruction Anabat Sampling Data and Post-construction Mortality Data for Bat Species.

	Activity [1]	Mortality [2]	
Wind Energy Facility	(No./Detector Night)	(Bats/Turbine/Year)	Reference
South Table, NE 2011	*5.8*	*N/A*	*TRC 2012*
South Table, NE 2009	*6.2*	*N/A*	*TRC 2010a*
Spring Canyon, CO	N/A	0.7	TRC 2008
Foote Creek Rim, WY	2.2	1.3	Gruver 2002
Buffalo Ridge, MN (Phase II)	2.1	2.2	Johnson et al. 2004
Buffalo Mountain, TN	23.7	20.8	Fiedler 2004
Top of Iowa, IA	34.9	10.2	Koford et al. 2005
Mountaineer, WV	38.3	38	Arnett et al. 2005
Top of Iowa, IA	34.9	10.3	Jain 2005

[1] Based on preconstruction bat studies.
[2] Based on post-construction bat studies.

No preconstruction bat surveys were conducted at the SCWP; therefore, an exact correlation of preconstruction bat use and post-construction bat fatalities cannot be determined. However, based on a 1-year post-construction mortalities study conducted at SCWP, 14 bats fatalities were recorded (at 20 turbine survey plots), resulting in an estimated 0.7 bat/fatalities/turbine/year. Based on a fatality rate of 0.7 bats/turbine/year and given that environmental setting of the SCWP and STWF are similar, an estimated 28-240 bat fatalities/year could occur as a result the 40-turbine STWF Project. It should also be noted that this estimate could be lower if fewer larger capacity wind turbines are installed. In addition, the STWF project area is not located near any known bat colonies or other features that are likely to attract large numbers of bats. The STWF project area does not contain any topographic features likely to funnel migrating bats. Given the proximity of the STWF to the SCWP, the potential bat mortalities/turbine/year are likely to be closer to that observed at the SCWP.

An ABPP would be developed to minimize and mitigate any unforeseen impacts to avian and bat species that may occur as a result of the project. The ABPP is recommended as a way to identify and minimize risk to all migratory and residential birds and bats (NG&PC 2011a). The use of an ABPP for this project would reduce and mitigate impacts to avian and bat species. The ABPP would utilize adaptive management to address any unforeseen impacts to birds and bats due to collisions with the turbines or barotrauma in the case of bats.

Raptors and Other Migratory Birds

Birds, including raptors, may be directly impacted due to collisions with turbines, meteorological towers, overhead power lines, and substation structures, and through habitat loss due to vegetation disturbance, human presence, and noise.

The majority of impacts to birds from operation of the STWF Project would result from collision with the wind turbines and displacement as a result of noise and disturbance near the wind turbines.

Recent studies estimated that bird fatalities at wind energy facilities probably represent from 0.01 to 0.02% (i.e., 1 out of every 5,000 to 10,000 avian fatalities) of the annual avian fatalities in the U.S. (Arnett et al. 2007). Bird deaths caused by wind turbines are a small fraction of the total anthropogenic bird mortality (Committee on Environmental Impacts of Wind Energy Projects 2007). In 2003, it was estimated that turbine collisions killed 20,000 to 37,000 birds, with all but 9,200 of those deaths occurring in California. In comparison, collisions with buildings kill 97 to 976 million birds annually, and collisions with cars may kill 80 million birds per year (Erickson 2004). It is estimated wind turbines kill 33,000 birds annually (Erickson et al. 2001; USFWS 2002). Data suggest an average of 2.19 avian fatalities per turbine per year in the U.S. for all species combined, and 0.03 raptor fatalities per turbine per year (Erickson et al. 2001). Studies show that avian mortality rates from wind energy facilities vary greatly by region and species, with higher concentrated impacts in northern California and Appalachia (General Accounting Office [GAO] 2005). Excluding California, an average of 1.83 avian fatalities per turbine per year and 0.006 raptor fatalities per turbine per year have been documented (Erickson et al. 2001). Studies conducted to date indicate that, in the U.S., passerines and raptors appear to be the most susceptible to turbine collisions (American Wind Energy Association [AWEA] 1995).

Passerines comprise a large proportion of the fatalities at wind facilities and involve both residents and migratory species (Erickson et al. 2002). As discussed above, one post-construction avian mortality study was conducted in 2006-2007 at Spring Canyon Wind Project (SCWP) located approximately 35 mi east of the STWF. The post-construction mortality survey was conducted at 20 of the 40 operating turbines. Twenty-three avian carcasses were found between September 2006 and August 2007 (1 year) at the SCWP resulting in 1.15 fatalities per turbine per year (TRC 2008). The average distance a carcass was from the search turbine was 203 ft with a range of 16 to 479 ft. Horned lark (14; 61% of all birds found) was the most common species located, with one to three birds of the other six species found--mourning dove, common nighthawk, Wilson's warbler, vesper sparrow, lark bunting, and western meadowlark. One raptor carcass, a short-eared owl, was found, and based on this study, raptor mortality was found to average 0.05 raptors/turbine/year. More bird fatalities (four per month) were found during carcass searches conducted in July and August than any other month and generally corresponds to fall migration for many species (TRC 2008). Therefore, it is reasonable to expect total avian mortality between 1.2 and 1.3 birds per turbine per year at the STWF.

In order to provide an additional assessment of the potential impacts to golden eagles that occur in and near the STWF project area, TRC developed and implemented a systematic sampling plan to collect data on eagle use within and near the project area. TRC biologists spent hundreds of additional hours observing golden eagles and other raptors beyond the avian point count surveys discussed above (TRC 2011a, 2011b, 2011c, 2001d; Appendix C). Based on 2009 and 2011 golden eagle observational and use data collected within and adjacent to the proposed STWF project area, eagles spatial use was concentrated in close proximately to the golden eagle nest located in SWSW Section 22, T14N, R54W (Figure 3.6). The observations revealed that when not in flight or not incubating eggs on the nest, eagles at this nest site were often observed perched on the rock cliff adjacent to the nest or on a power pole along the county road within about 500 ft of the nest. Most flight patterns were generally north and outside of the project area (refer to Figure 3.5 and Appendix C); however, early in the nesting season, several observations in early April 2009 and 2011 were noted approximately 3.0 mi south or east of the nest.

It was also noted that flight height increased as distance from nest increased. Observations indicate that eagles observed greater than 1.0 mi from the nest were soaring at heights estimated at >135 m, which is above the general RSA of a 1.5-MW turbine. Based on the preliminary results of the golden eagle use survey of the project area and flight heights, GEI agreed to and relocated five wind turbines from their original turbine array that were located within 1.0 mi of the golden eagle nest located in Section 22, T14N, R54W. Results of the 2011 surveys support the mitigation measure presented in this EA to keep wind turbines at least 1.0 mi away from the golden eagle nest located in SWSW Section 22, T14N, R54W.

In addition, no prairie dog colonies occur in the STWF project areas and the closest prey source is likely four prairie dog colonies located north of I-80 and more than 5.0 mi north of the proposed STWF project area. Because most of the eagle flights patterns were north of the STWF project area, it may be concluded that the eagles in this territory are likely utilizing these and other prairie dog colonies further away from the project area as food sources. In 2011, during the 10-mi eagle nest survey (TRC 2011c), one golden eagle was noted, perched on a rock overlooking one of these prairie dog colonies. No other prairie dog colonies or ground squirrel concentration areas were observed in the project area or within a 10-mi radius of the project area.

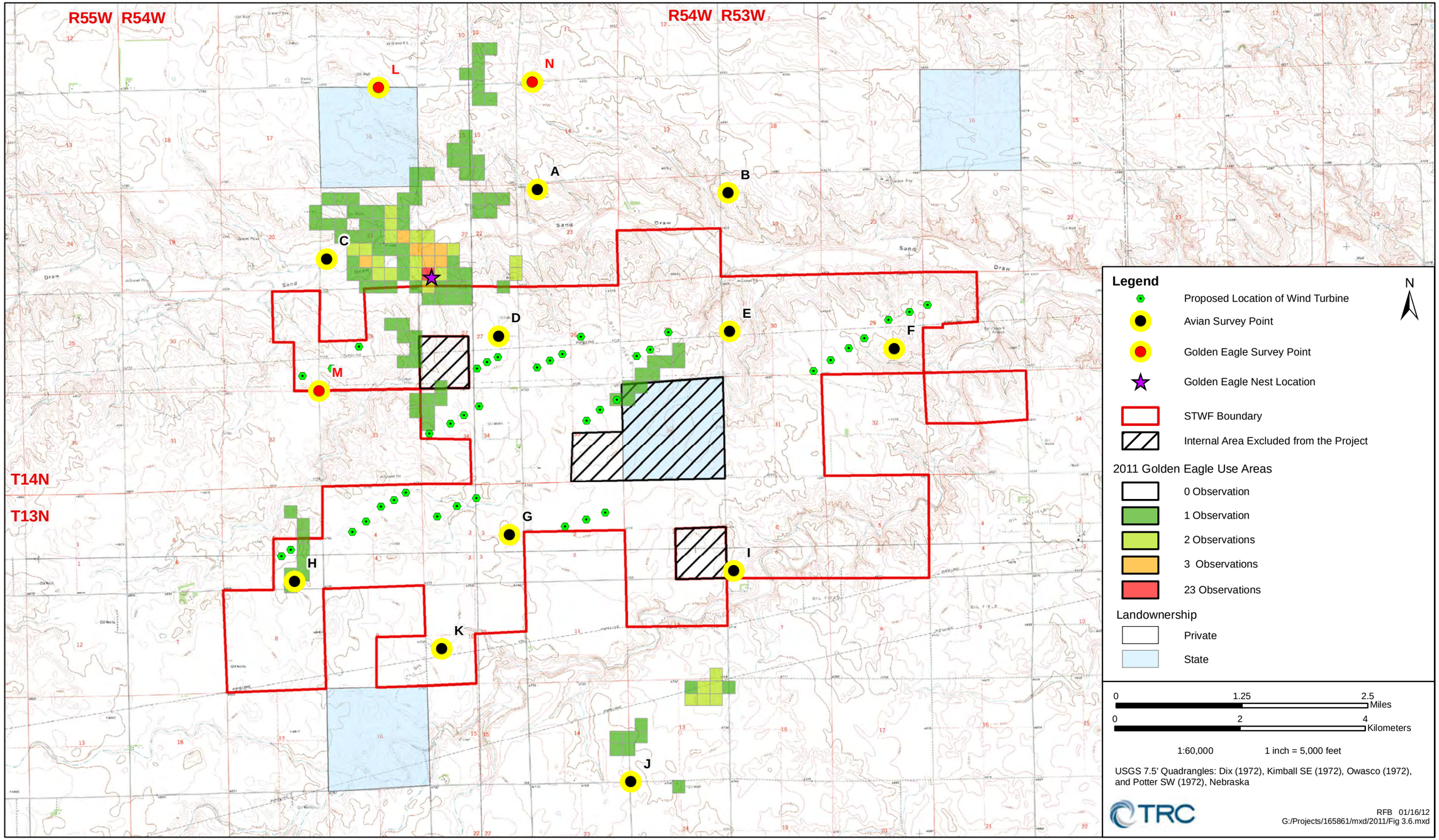


Figure 3.6 Golden Eagle Use Areas, 2011, STWF Project Area.

This page is intentionally left blank.

In general, the habitat within the project area and vicinity is rolling shortgrass prairie and agricultural fields with few trees. Many vertical reliefs (i.e., cliffs) located in the project area and vicinity that could provide potential nesting habitat tend to consist of steep hillsides broken by relatively short outcrops of rock and ledges, which do not provide isolation and protection from ground predators such as coyotes. Crags tall enough to provide isolated ledges do exist within the project area and the 10-mi radius of the project area (except for the active golden eagle nest), but are uniformly not capable of providing suitable nesting habitat. As a result there is limited suitable nesting habitat for golden eagles in the project area and within a 10-mi radius of the project area. In summary, the most suitable substrate capable of supporting the size and weight of a golden eagle nest in the project area or vicinity is the one occupied nest located in SWSW Section 22, T14N, R54W, and this nest has been used consistently for several years.

Therefore, the results of the 2009 and 2011 golden eagle surveys (TRC 2010b, 2011b, 2011c, 2001d, 2011e) indicate that wind turbines located beyond the 1.0 mi buffer of the existing nest would likely pose a limited risk to golden eagles in the general project area.

This level of mortality is not expected to have population level consequences for individual species because the large population sizes of common species (e.g., horned lark and western meadowlark) and the low impacts of small fatality rates. It has been suggested that resident birds may have a higher probability of colliding with turbines than migrants because residents tend to fly lower and spend more time in the area (BLM 2005). Although population effects may be possible for some species, no studies have thus far documented such effects (BLM 2005).

Estimating potential risks to avian species due to collisions with wind turbine can be evaluated using a risk index model (Johnson et al. 2000; Erickson et al. 2003; Young et al. 2003). Risk index is the risk exposure to turbine collision for each bird species.

Estimating risk exposure is difficult because abundance and behavior influence the risk of exposure. Although it has been widely used in wind energy studies (e.g., Johnson et al. 2000; Erickson et al. 2003; Young et al. 2004) the exposure risk model has been validated by few post-construction fatality studies (for an exception see Johnson et al. 2000). The exposure risk does not take into account factors such as bird behavior, flight styles, and varying abilities of birds to

detect turbines, all of which may be important factors in determining risk of collision with turbines. Therefore, the index is useful primarily as an indicator of those species in the project area that had the highest exposure to the wind turbine RSA. It also facilitates comparisons of risk among selected species in the project area.

Based on 2009 avian use studies of the STWF, Swainson's hawks had the highest risk index (0.0413) of all RLB in the survey, followed by red-tailed hawks and ferruginous hawks, which had a risk index of 0.0248 and 0.0124, respectively (TRC 2010b). Golden eagle was not observed flying in RSA during the 2009 studies; therefore, a risk index of 0 was calculated for golden eagle. Data collected subsequent to the 2009 studies indicate that golden eagles do fly at heights within the RSA. This was well documented within a 1.0-mi buffer of the active golden eagle nest in 2011 (TRC 2011a). Based on the 2011 golden eagle observations and flight pattern, STW established a 1.0-mi turbine setback from the nest to minimize potential impacts to golden eagles.

Horned lark was the most abundant passerine documented in the STWF project area during both spring and fall 2009 surveys and had the highest risk index of 1.92, followed by McCown's longspur (1.24) and rock pigeons (0.04) (TRC 2010b).

Given the abundance of horned larks in the project area and the mortality rates documented for this species compared to other species in several wind farm avian mortality studies (Young et al. 2003; Erickson et al. 2002; Erickson 2004; National Research Council 2007), it is likely that wind farm-related mortality would be highest for horned lark relative to other bird species occurring in the STWF project area. This species may be especially vulnerable to collision with turbines during the breeding season because of their distinct aerial courtship displays. However, despite their vulnerability to collisions, it is likely that turbine-related mortality in the STWF project area would have limited impacts on horned lark populations. Many of the other passerine birds were not observed flying within the RSA, so risk value is assumed to be low.

Studies have also shown that densities of bird populations in the vicinity of wind energy projects may be reduced near turbines if continuous noise levels are in the range of 40 dBA or higher

(BLM 2005). Birds hear best between about 1 and 5 kHz (Dooling 2002), and studies have also shown that blade noise from a normally operating wind turbine would simply add to the background noise and would be inaudible to birds at a distance of approximately 80 ft from the turbine when the blade and wind noise levels are within 1.5 dBA of one other (BLM 2005). Birds cannot hear the noise from wind turbine blades as well as humans, and most likely a human with normal hearing can hear a wind turbine twice as far away as the average bird (Dooling 2002). Turbine blade defects that produce whistles may be more audible to birds and, at the same time, make no measureable contribution to overall noise level (Dooling 2002).

One study suggests that nesting grassland passerines may be displaced by wind energy facilities (Leddy et al. 1999) and occupy other areas. However, another displacement study in Montana has not detected any significant displacement of nesting grassland birds within a wind energy facility (TRC 2009c).

An ABPP would be developed to minimize and mitigate any unforeseen impacts to avian and bat species that may occur as a result of the project. The ABPP is recommended as a way to identify and minimize risk to all migratory and residential birds (NG&PC 2011a). The use of an ABPP for this project would reduce and mitigate impacts to avian and bat species. The ABPP would utilize adaptive management to address any unforeseen impacts to birds and bats due to collisions with the turbines or barotrauma in the case of bats.

In addition, all permanent met towers would be self supported (i.e., nonguyed) to minimize avian collisions and mortalities.

Decommissioning Phase

Mammals (Including Big Game)

Impacts to wildlife during the decommissioning phase of the STWF Project would be similar to impacts associated with their construction, but of reduced magnitude. Removal of facility components would eliminate the impacts associated with wildlife collisions with STWF

structures. Wildlife habitat in the area is expected to return to preproject conditions following decommissioning and site restoration.

Disturbance to wildlife habitats and wildlife during decommissioning of the STWF project facilities is expected to be localized, short-term, and minor. Impacts to wildlife would be minimized, where practicable, and the implementation of environmental protection measures during decommissioning, including seasonal wildlife stipulations, dust suppression, contaminant control, control of nonnative invasive species, and revegetation of impact areas with native seed mixtures, would minimize potential disturbance or impacts to wildlife habitats and species. Protection measures for the project can be found in Chapter 2.0 of this EA.

No additional impacts to bats beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project.

Raptors and Other Birds

No additional impacts to raptors and other birds beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. The removal of a limited amount of natural vegetation (grassland and shrub communities) would be minimized to the extent possible during decommissioning of the project. In addition, the movement of personnel and equipment on-site would be limited to the extent possible to construction areas to avoid inadvertent compaction of vegetation.

Raptors could be impacted as a result of decommissioning-related disturbance during the nesting season. To avoid impacts to nesting raptors during the decommissioning phase of the project, STW would continue to implement the same seasonal restriction areas as implemented during the construction phase of the project.

3.6.2.3 Impacts of the No Action Alternative

No impacts to wildlife would occur under the No Action Alternative beyond those that already exist.

3.6.2.4 GEI's Mitigation Measures

To minimize impacts to wildlife, STW would implement the following mitigation measures.

- STW would prohibit hunting, fishing, dogs, or possession of firearms by its employees and its designated contractor(s) in the project area during construction, operation, and maintenance.
- Surface disturbance would be avoided or minimized in areas of high wildlife value (e.g., prairie dog colonies and shelterbelts).
- STW would advise project personnel regarding appropriate speed limits on roads to minimize wildlife mortality due to vehicle collisions. Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor would be disciplined and may be dismissed by STW and/or prosecuted by NG&PC.
- Travel would be restricted to designated roads and construction areas and no off-road travel would be allowed except in emergencies.
- Posted speed limit signs would be installed on project roads in cooperation with Kimball County officials.

The following additional measures would be implemented to minimize impacts to raptors.

- STW would not install any wind turbines within 1.0 mi east and south of the golden eagle nest located in Section 21, T14N, R54W, near the northwest border of the project area.
- Prior to construction, raptor nest surveys would be conducted within a 1.0-mi radius of proposed construction areas during the raptor nesting season (January 1 through July 31) to determine nest location, activity status, and, if possible, species prior to construction.
- If raptors are found nesting within or near the project area, construction would be sequenced to avoid construction activities within 0.25 mi of any active Swainson's or red-tailed hawk nest and 50 ft from any burrowing owl nest until the young have fledged or the nest is abandoned or has failed.

- Additional mitigation for raptors would be designed on a site-specific basis, as necessary, in consultation with USFWS and NG&PC. STW would notify the USFWS or NG&PC immediately if raptors are found nesting on project facilities (i.e., power poles, towers).
- Construction of new power lines would follow the recommendations of the Avian Power Line Interaction Committee (2006) to avoid electrocution of raptors and other avifauna.
- Post-construction avian and bat mortality surveys would be conducted for 2 years following construction.
- Lighting the wind turbines would be in accordance with USFWS and FAA recommendations to aid in the reduction of avian and bat mortalities.

In addition to the conservation measures stated above, an ABPP would be developed to minimize and mitigate any unforeseen impacts to avian and bat species that may occur as a result of the project. The ABPP is recommended as a way to identify and minimize risk to all migratory and residential birds (NG&PC 2011a). The use of an ABPP for this project would reduce and mitigate impacts to avian and bat species. The ABPP would utilize adaptive management to address any unforeseen impacts to birds and bats due to collisions with the turbines or barotrauma in the case of bats.

3.7 THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES AND STATE-LISTED SPECIES

3.7.1 Environmental Setting for the Proposed Project

A list of federal- and state-listed Threatened, Endangered, Proposed, and Candidate (TEPC) species for Kimball County, Nebraska, was obtained from the NG&PC and USFWS websites on July 13, 2011, and September 4, 2011 (Table 3.10). Specific species information such as species distribution maps were obtained from the NG&PC website. Recommended species protection, applicant committed measures, and mitigation measure were obtained through a series of conference calls with USFWS and NG&PC biologists during the preparation of this document

Table 3.10 Federal- and State-listed Species that May Occur in Kimball County, Nebraska.[1]

Species	Status[1]	Habitat	Potential to Occur in Project Area or to be Affected by the Project
Black-footed ferret	FE	Prairie dog colonies	None; no prairie dog colonies
Gray wolf	FT	Opportunistic, found in a range of habitats, but generally occur in areas that big game occur as a prey source	Rare occurrence
Colorado butterfly plant	FT, SE	Subirrigated, alluvial soil floodplains; Southeastern Wyoming, north-central Colorado, and extreme western Nebraska	None; no suitable habitat present
Mountain plover	ST	Sparse shortgrass or mixed grass prairie; also in short sagebrush plains; often associated with prairie dog colonies	Suitable breeding, nesting, and foraging habitat; recorded in project area
Swift fox	SE	Shortgrass prairie, but can be found in sagebrush-grasslands; they are found particularly in sparsely vegetated areas such as prairie dog colonies	Suitable breeding and foraging habitat; recorded adjacent project area

[1] Source: NG&PC (2011a, 2011b), USFWS (2011a), RMBO (2011a), and RMBO (2011b).
FE = Federal Endangered
FT = Federal Threatened
SE = State Endangered
ST = State Threatened

and were involved in the presiting phase of the project in 2007-2008 (TetraTech 2008; West 2008).

3.7.1.1 Federal-listed Species

The black-footed ferret, gray wolf, and Colorado butterfly plant are the only federally- listed species that may occur in Kimball County, Nebraska (USFWS 2011; NG&PC 2011a and NG&PC 2011b, Sightline Institute, 2011a; RMBO 2011a). The black-footed ferret was given federal legal protection as an endangered species in 1967. The ferret has been included on Nebraska's list of endangered species since the *Nebraska Endangered Species Act* was passed in 1975.

In Nebraska, the black-footed ferret occurred historically in the western three-quarters of the state, coinciding with the range of the prairie dog (NG&PC 2011b). It was feared the black-footed ferret might be extinct, until one was killed by a ranch dog in northwestern Wyoming in September 1981. That occurrence led to the discovery of a population of about 130 animals in 1984. Unfortunately, an outbreak of plague and later an outbreak of canine distemper nearly eliminated the ferret population. The remaining 18 ferrets were taken into captivity between 1985 and 1987 to form a captive population that numbers about 300 adults today. The reintroduction of captive breed ferrets into the wild has occurred in Wyoming, South Dakota, and Montana. No reintroductions have been established in Nebraska.

Prairie dogs comprise approximately 90% the black-tailed ferret's diet; therefore, suitable habitat for this species is dependent upon the presence of prairie dog colonies. No prairie dog colonies occur in the STWF project area. The nearest known prairie dogs colonies are located north of I-80 about 4.0 mi north of the STWF project area (TRC 2011d). Due to the lack of suitable black-footed ferret habitat and given that the nearest ferret reintroduction area is near the Badlands of South Dakota, the potential for black-footed ferrets is highly improbable. The STWF Project would not impact the black-footed ferret; therefore, this species is not discussed further in this EA.

Wolves were once common throughout all of North America (including Nebraska) but were killed in most areas of the U.S. by the mid-1930s. Today, their range has been reduced to Canada and the following portions of the U.S.: Alaska, Idaho, Michigan, Minnesota, Montana, Wisconsin, and Wyoming. Mexican wolves are found in New Mexico and Arizona. The Nebraska Natural Heritage Program does not have any recent documentation of gray wolves in Kimball County, Nebraska (NG&PC 2011a). The nearest known wolf populations are likely in northwest Wyoming in the Greater Yellowstone ecosystem (USFWS 2011b). It is likely that the wolves that historically occurred in Nebraska preyed on bison. No recent records of wolves have been recorded in Nebraska. The probability of gray wolf to occur in the STWF project area is extremely low; therefore, this species is not addressed further in this EA.

The Colorado butterfly plant typically occurs on subirrigated alluvial soil on level or slightly sloping floodplains and drainage bottoms associated with streams at elevations of 5,000 to 6,400 ft. The Lodgepole Creek drainage, located approximately 6-10 mi northwest of the STWF project area, contains the only known population of Colorado butterfly in Nebraska (TetraTech 2008; Rocky Mountain Bird Observatory (RMBO) 2011a). No suitable habitat for Colorado butterfly plant occurs in the STWF project area; therefore, this species is not discussed further in this EA.

3.7.1.2 State-listed Species

The proposed STWF Project occurs in an area mapped by the NG&PC as "moderate sensitivity" for wind energy development (Figure 3.7) (NG&PC 2011a). The index of sensitivity of wildlife habitat was developed by NG&PC as an aid in planning wind energy development by identifying areas of the state that are considered relatively more sensitive to wind development with respect to select species of concern. The highest sensitive area occurs in the central portion of the state and is primarily associated with the central flyway where millions of migrating waterfowl, sandhill cranes, and some whopping cranes pass through each spring. The STWF is not located in any biologically unique or migratory bird landscapes (refer to Figure 3.7) (NG&PC 2011a).

The project area's shortgrass prairie/rangeland, CRP lands, and agricultural fields (refer to Figure 3.4) provide suitable habitat for mountain plover and swift fox. Within the survey area, 3,541 acres are shortgrass prairie/rangeland, 6,187 acres are cultivated fields, and 1,555 acres are CRP lands.

Mountain Plover

Mountain plover was listed as threatened in the State of Nebraska in 1976 (RMBO 2011b) and was also proposed for listing by USFWS in 1999 and 2009. After a thorough review of all available scientific and commercial information, the USFWS determined that the mountain plover is not threatened or endangered throughout all or a significant portion of its range (USFWS 2011c). The mountain plover remains listed as a threatened state species in Nebraska.

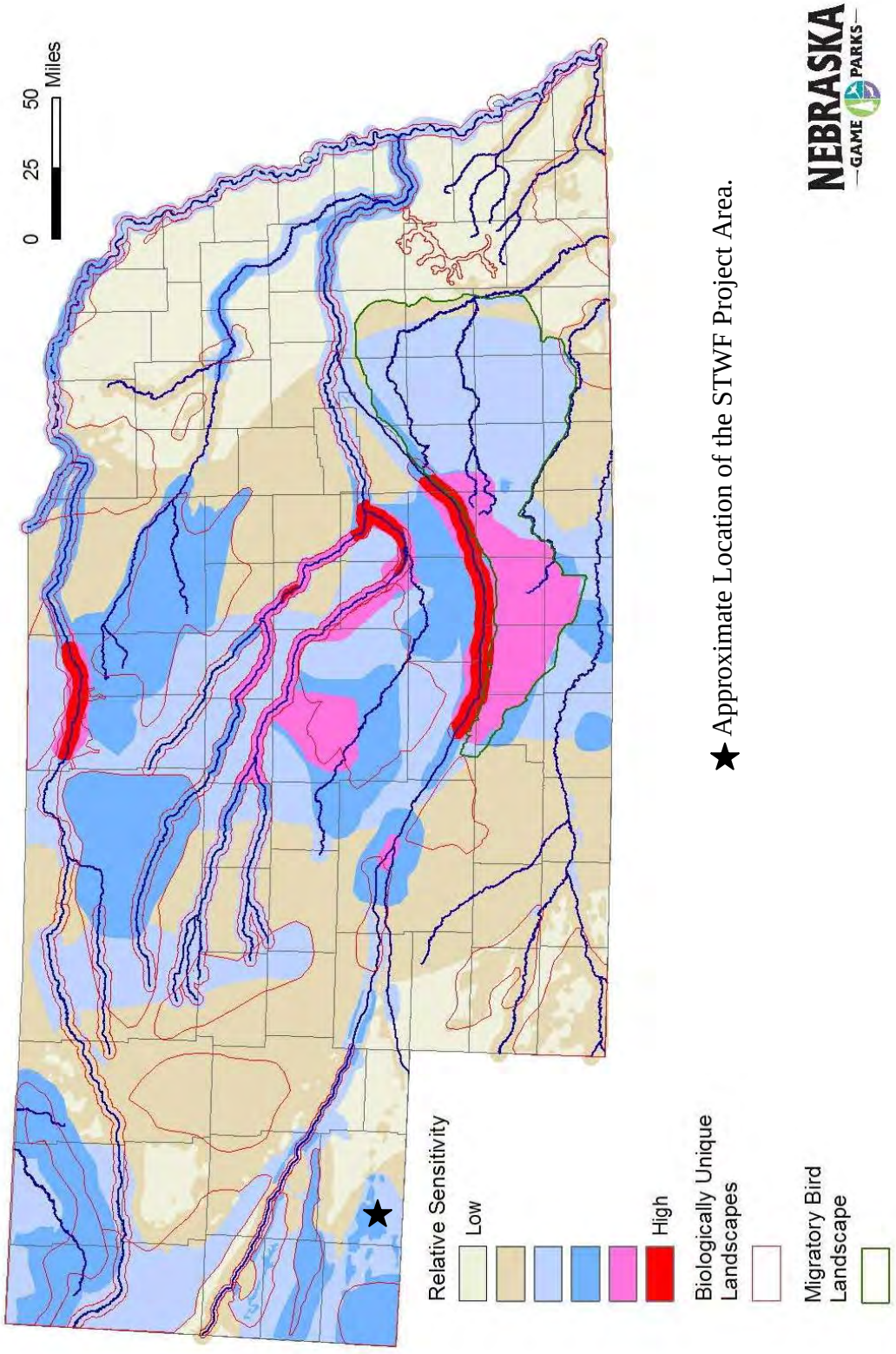


Figure 3.7 An Index of Sensitive Wildlife Habitats to Wind Energy Development Based on At-risk Species, NG&PC, March 2011.

Mountain plover inhabit dry shortgrass plains east of the Rocky Mountains (Dinsmore 1983, 2003; Knopf 1996) and is documented as breeding in Kimball County, Nebraska (RMBO 2011). Mountain plovers have also been observed in Banner and Cheyenne counties in southwestern Nebraska (RMBO 2011). This species is listed as a state-threatened species throughout its range because of apparent range-wide population declines (Knopf and Wunder 2006) and as a rare regular breeder limited to southwestern Kimball County (RMBO 2011b). Breeding habitat includes shortgrass prairie, cultivated fields, dryland areas with sparse vegetation, and prairie dog colonies (USFWS 2002). Suitable mountain plover nesting and foraging habitat occurs in the STWF project area.

Surveys for mountain plover were conducted in suitable habitat of the STWF Project and a 1.0 mi buffer during spring 2009 (West 2009). Mountain plover observations were supplemented by avian use surveys conducted in spring and fall 2009 and 2011 (TRC 2010b, 2012b). Numerous occurrences of mountain plover have been document within 1.0-mi of the STWF project area. In addition, the RMBO and others have been monitoring mountain plover occurrence and breeding in the Nebraska panhandle from 2002 to present (RMBO 2011). A core mountain plover habitat was designated west of Nebraska Highway 71 (personal communication via email, July 25, 2011, with Michelle Koch, NG&PC). Survey results indicate that mountain plovers are more numerous in Nebraska that previously believed (RMBO 2011b).

Mountain plover may also migrate through the project area. Therefore, they may occur in the STWF project area and vicinity during spring, summer, and fall (RMBO 2011b).

Swift Fox

Swift fox may occur in any of the project area's habitats and may den in the project area's shortgrass prairie. The swift fox prefer shortgrass and mixed-prairie habitats in gently rolling or level terrain (TetraTech 2008). The Sand Draw area located along the northern boundary of the STWF Project may provide the most suitable swift fox habitat. Swift fox track surveys were conducted in the vicinity of the SWTF Project in 2008 (West 2008), and two sets of swift fox

tracks were detected in the proposed STWF project area. However, it is possible that swift fox may occupy habitat within or adjacent the STWF project area.

No swift fox have been observed during any of the site visits to the STWF project area.

3.7.2 Environmental Impacts and Mitigation Measures

3.7.2.1 Impacts of Western's Proposed Action

Western's Proposed Action is limited to the interconnection to the existing Archer-Sidney transmission line. No additional structures such as power poles or additional electrical lines will be required and all electrical component necessary for the interconnection would be housed within the fenced substation area. Therefore, there would be no risk of electrocution to federal or state-listed species. No surface disturbing activities would be required under Western's Proposed Action, therefore there would be no loss of habitat or inadvertent take of a listed species as a result of the interconnection. No impacts to special statues and sensitive species would occur under Western's Proposed Action.

3.7.2.2 Impacts of GEI's Proposed Action

Construction Phase

Impacts to mountain plover during construction could include direct mortality due to collisions with vehicles, inadvertent nest destruction, and displacement from habitat due to noise and human activity. STW would conduct mountain plover surveys in all suitable habitat prior to construction, and, if nests are found, STW would avoid construction within 0.25 mi of a nest until the chicks are mobile (about 35 days after the nest is discovered or 7 days posthatching). Employees would also be instructed on how to identify mountain plover and to avoid driving in areas where mountain plover are seen until the area has been inspected for nests by a qualified biologist. Impacts to mountain plover are expected to be negligible during the construction phase of the project.

Direct impacts to swift fox during construction could include direct mortality due to collisions with vehicles and inadvertent destruction of dens. Indirect impacts could include displacement from habitat due to noise and human activity and loss of prey base. STW would conduct preconstruction surveys for swift fox dens to minimize any direct impacts to swift fox and their young, and STW would avoid disturbance within 0.25 mi until any young have left the den. Swift fox are probably rare visitors to the project area due to the prevalence of tilled cropland and thus potential for impacts to this species is low.

O&M Phase

Impacts to mountain plover during the O&M phase could include direct mortality due to collisions with vehicles and overhead lines and inadvertent nest destruction, particularly if mountain plover elect to nest on turbine pads or along access roads and ROWs. Operational impacts could also include mountain plover collisions with turbines. However, because mountain plover tend not to fly and typically fly close to the ground when they do (BLM 1995), collision-related mortalities should be minimal. During courtship, mountain plover fly to heights of about 15 to 30 ft, hold their wings in a deep "V" position, and float slowly to the ground. During this display, mountain plovers would be well below the lowest reaches of the rotors (135 ft). Impacts to mountain plover are expected to be negligible.

Direct impacts to swift fox plover during the O&M phase could include direct mortality due to collisions with vehicles. Indirect impacts could include displacement from habitat due to noise and human activity and loss of prey base. Swift fox track surveys found that swift fox occurred in a portion of the STWF project area (West 2008); however, it is likely a rare or occasional visitor to the project area, and the O&M phase of the project would be expected to have minimal impacts on this species.

Decommissioning Phase

Disturbance to mountain plover and swift fox during decommissioning of the STWF project facilities is expected to be localized, short-term, and minor. During the decommissioning phase,

a limited amount of area would be redisturbed by crews removing the project components, and most of these areas would be associated with access roads and the tower and turbine lay down areas at the turbine pads. The removal of revegetated areas would be minimized to the extent possible during decommissioning operations. In addition, ground-disturbing activity and the movement of decommissioning personnel and equipment on-site would be limited to the extent possible to the required areas to avoid inadvertent impacts to all wildlife species, including the mountain plover and swift fox. Impacts to mountain plover and swift fox from decommissioning of the STWF Project would be similar to impacts associated with their construction, but of reduced magnitude. Noise and disturbance to these species may temporarily increase during decommissioning and site restoration relative to conditions during project operation. New habitat loss would be negligible, and possible injury and mortality would be much lower than during construction.

3.7.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, there will be no impacts to federal- or state-listed species beyond those that already exist.

3.7.2.4 GEI's Mitigation Measures

The following measures would be implemented to minimize impacts to federal- or state-listed species.

To minimize impacts to state-sensitive species that may occur within the project area, STW would limit the surface disturbed areas to that which is needed for safe and efficient construction, and all disturbed areas not needed for operation would be reclaimed as soon as possible after construction is complete. Additional mitigation measures for migratory birds and two state-sensitive species--mountain plover and swift fox--are presented below.

- To minimize potential impacts to mountain plover, preconstruction nest surveys would be conducted in suitable habitat within proposed disturbance areas.

- If nests are located, STW would avoid construction within 0.25 mi of the nest until the chicks are mobile
- To minimize impacts to migratory birds and the state-listed mountain plover, STW would use standard bird-friendly wind energy turbine and project design technology, including unguyed tubular towers and slow-rotating upwind rotors.
- To minimize impacts to mountain plover, STW would not place turbines or conduct construction activities within 2.0 mi of mountain plover core habitat east of Nebraska State Highway 71.
- To minimize impacts to swift fox and their dens, preconstruction surveys would be conducted to locate any potential dens, and STW would avoid disturbance of these areas by 0.25 mi until any young have left the den.
- All collector lines would be buried to avoid impacts to migratory birds and bats from possible collision or electrocution.
- STW would prohibit hunting, fishing, dogs, or possession of firearms by its employees and its designated contractor(s) in the project area during construction, operation, and maintenance.
- Travel would be restricted to designated roads and construction areas and no off-road travel would be allowed except in emergencies.
- Posted speed limit signs would be installed on project roads in cooperation with Kimball County officials.

3.8 CULTURAL RESOURCES (INCLUDING NATIVE AMERICAN CONSULTATION)

3.8.1 Environmental Setting of the Proposed Project

The project area is within the central portion of the Great Plains physiographic province as described by Fenneman (1931). This High Plains physiographic province primarily consists of broad fluviatile plains composed of unconsolidated silt, sand, and gravel. The project area is located near the eastern edge of the High Plains on the eastern end of the Cheyenne Tableland (Maher et al. 2003). The surface sediments are residual deposits of the late Tertiary age (Pliocene) Ogallala group and are typified as sand, gravel, and silt containing fragments of

calcareous rocks and "mortar beds" of conglomerate of varying degrees of hardness, as well as fragments of igneous and sedimentary formations outwashed eastward from the Rocky Mountains. These beds also contain a chalcedony material reminiscent of the White River Group Silicates from the Oligocene-aged Chadron formation (Miller 1991). The project area is located within the Sidney Loam type soil (USDA 2005). Soils of this type consist of a range of sandy, silty, well-drained loamy soils underlain by calcareous material. Outcrops of calcareous material occur throughout the general project area.

A Class III (pedestrian) cultural resource surveys of areas proposed for disturbance a result of the STWF Project was conducted in 2010. The Class III cultural resource inventory for the STWF Project resulted in 18 newly discovered sites (one historic site, one multicomponent historic/prehistoric site, and 16 prehistoric sites) and the relocation of one previously recorded site. Only one of the sites was recommended as eligible for the NRHP (TRC 2010c). Because of the sensitive nature of these sites, the location of this site is not identified in the document.

Western has conducted Native American consultation in accordance with Section 106 of the *National Historic Preservation Act* for the western portion of the project (the substation area). However, to date, Western has received no comments on the Federal Action from any tribes.

The area of potential effect (APE) for the western portion of the project is defines as the substation and O&M area and the alternate substation area. In addition, the visual APE is defined as the original APE and a 3.0-mi buffer around the original APE (Figure 3.8).

3.8.2 Environmental Impacts and Mitigation Measures

3.8.2.1 Impacts of Western's Proposed Action

The APE for Western's Proposed Action is the area that would be directly impacted by the proposed project (i.e., a portion of the substation area or an alternate substation area). In addition, the visual APE for Western's Proposed Action is the APE area and a 2.0-mi buffer around the STW project area (refer to Figure 3.8).

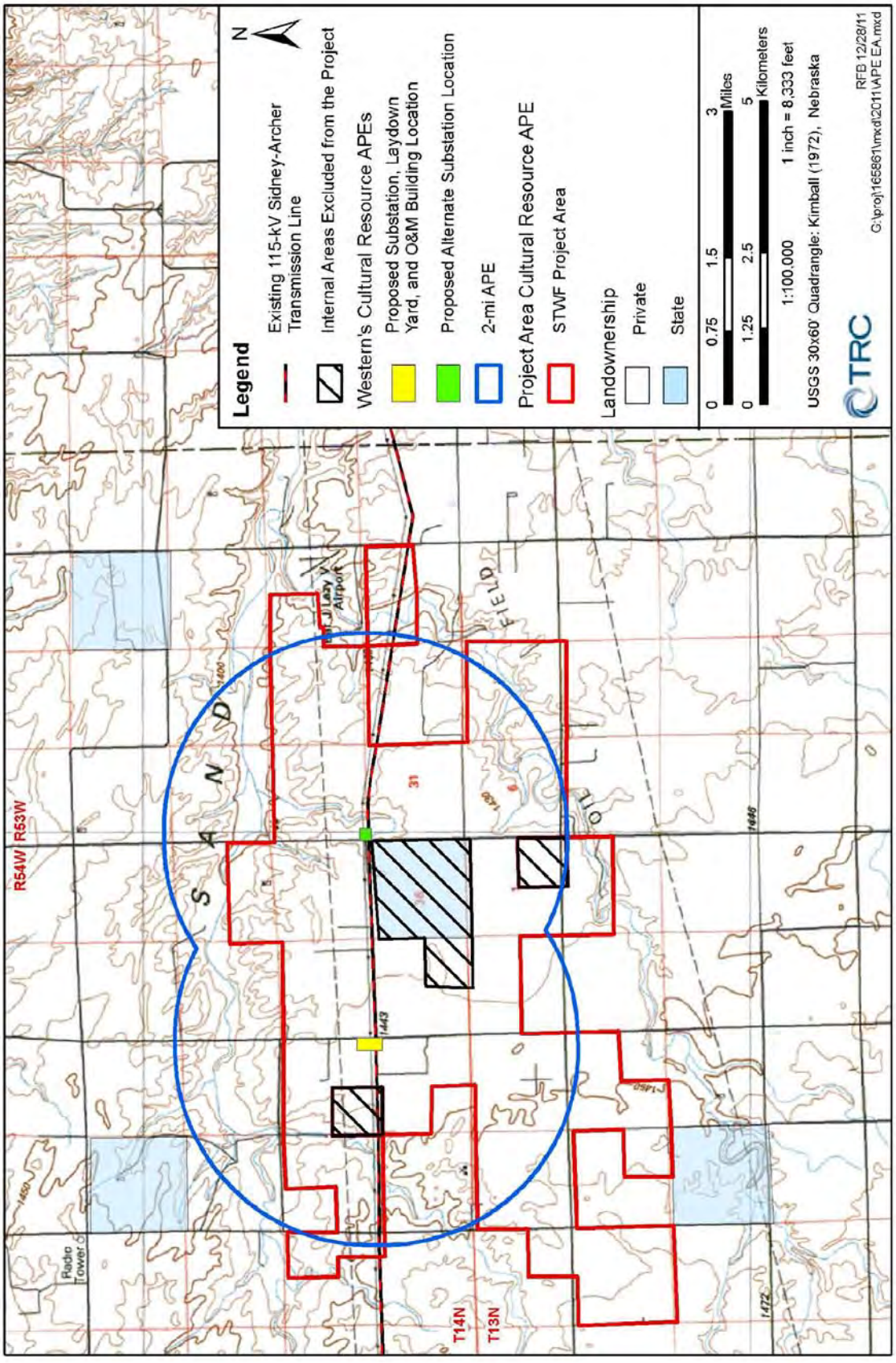


Figure 3.8 Cultural Resource Visual APEs for South Table Wind Farm.

Western's Proposed Action would result in no surface disturbance and there would be no impacts to the APE. In addition, Western's Proposed Action would result in the installation of certain electrical equipment which would result in no impacts to the visual APE.

3.8.2.2 Impacts of GEI's Proposed Action

Construction Phase

A cultural resource inventory was completed for the APE for the Western portion of the proposed project area and it was determined that there were no NRHP-listed or NRHP-eligible cultural resources sites and only one non-NRHP eligible site within this area (TRC 2010c). In addition, there are no NRHP-listed or NRHP-eligible sites and only one non-NRHP eligible sites were identified within the visual APE for the project. Therefore, GEI's Proposed Action would not result in any adverse impacts to any NRHP-listed or NRHP-eligible sites within APE or the visual APE of the Western portion of the proposed project.

In addition, a cultural resource inventory was completed for the APE for the remaining portion of the proposed project area and only one NRHP-eligible site (5KM22) was identified and STW has agreed to maintain a minimum of 300-ft disturbance buffer around this site during project construction. Therefore, there would be no affect to any know NRHP-listed or NRHP-eligible site during project construction.

Additionally, the location of some project construction plans, such as collector lines and access roads for example, have not been finalized and have not been inventoried for cultural resources. STW has committed to conduct a Class III inventory for any area not previously surveyed that would be disturbed to protect any NRHP-eligible sites.

Construction personnel would be instructed that they are not allowed to search for or remove cultural resources while working on this project.

If any cultural resource (historic or prehistoric site or object) is discovered by STW or any person working on its behalf during construction, O&M, or decommissioning operations, STW would suspend all construction operations in the immediate area of any such discovery and immediately notify the Nebraska SHPO and would implement appropriate mitigation measures to protect NRHP eligible sites. Therefore, there would no impacts to unanticipated cultural resources, including NRHP-eligible sites.

In addition, Western is in the process of completing Native American consultation, and such consultation would be completed before STW would be authorized to begin construction operations on the project.

Operations Phase

There would be no project effect to NRHP-eligible sites during the O&M phase of the project. In addition, STW would instruct all O&M personnel that they are not allowed to search for or remove cultural resources while working on this project. Therefore, there would be no impacts to cultural resources during the O&M phase of GEI's Proposed Action.

Decommission Phase

There would be limited additional disturbance during the decommissioning phase of GEI's Proposed Action, but there would be no impacts to NRHP-eligible sites. In addition, construction personnel would be informed that they are not allowed to search for or remove cultural resources while working on this phase of the project. Therefore, there would be no impacts to cultural resources during the decommissioning phase of GEI's Proposed Action.

3.8.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, there would be no impacts to cultural resources beyond those that already exist.

3.8.2.4 GEI's Mitigation Measures

The following mitigation measures would be implemented to minimize impact to cultural resources:

- STW would not conduct any ground-disturbing activities on lands that have not been inventoried by a qualified archaeologist for cultural resources. All inventory reports would be submitted to Western (if the substation or alternative substation locations are included) and Nebraska SHPO for review and approval before the proposed ground-disturbing activity in initiated.
- NRHP-eligible Site 5KM22 would be avoided by a minimum of 300 ft.
- Construction and O&M personnel would be instructed that they are not allowed to search for or remove cultural resources while working on this project.
- If any cultural resource (historic or prehistoric site or object) is discovered by STW or any person working on its behalf during construction, O&M, or decommissioning operations, STW would suspend all construction operations in the immediate area of any such discovery and immediately notify the Nebraska SHPO and implement appropriate mitigation measures to protect NRHP eligible sites.

3.9 LAND USE, TRANSPORTATION, AND RECREATION

3.9.1 Environmental Setting for the Proposed Project

Land use within the project area is primarily agricultural, with dryland winter wheat as the principal crop. Large areas of CRP land also occur in the project area (see Section 3.5.1 and Figure 3.4) and provide recreational opportunities such as hunting. Areas of native prairie/rangeland are used for livestock grazing and also serve as wildlife habitat. Other land uses include transportation (roads and pipelines), oil and gas production, power transmission, residential use, and recreation (big game and pheasant hunting). I-80 is located approximately 5.0 mi north of the STWF Project. Kimball County Road 59 is the only paved road that bisects the STWF project area north to south. An extensive network of gravel-surfaced county roads has

been constructed throughout the project area. The nearest Nebraska state highway is State Highway 71, which is located 6.0 mi west of the western STWF project boundary. There are no state or national parks, Wild and Scenic rivers, or other areas of recreational, scenic, or aesthetic importance in the project area. Since the project area is entirely located on private land, recreation is generally limited to the landowners themselves or granted to others by the landowners, except for use of the county roads to access walk-in hunt areas (e.g., CRP land).

The nearest developed Nebraska State Recreational Area is Oliver Lake Recreation Area located 8.0 mi west of Kimball on U.S. Highway 30. The 917 acres of land and 270-acre Oliver Lake Recreation area is the only water-based recreational facility in the southwest panhandle of Nebraska. Recreational activities include camping, hiking, boating, hunting, fishing, swimming, skiing, and picnicking. The Oliver Lake campground provides 75 camping pads without electricity and 100-non-pad sites without electricity (Kimball Visitor Information 2011).

Other areas of recreational interest in the Kimball area include several places listed on the NRHP--Brookside Farm, the Maginnis Irrigation Aqueduct, and the Stone Building. Brookside Farm is a well-preserved historic farmstead with a collection of buildings and structures. The Maginnis Irrigation Aqueduct is an exceptionally well-preserved twentieth-century aqueduct, and the Stone Building is a two-story structure built between 1893-94 of rough-cut locally quarried limestone (Kimball Visitor Information 2011).

3.9.2 Environmental Impacts and Mitigation

3.9.2.1 Impacts of Western's Proposed Action

Western's Proposed Action would not impact land use, transportation or the recreational opportunities.

3.9.2.2 Impacts of GEI's Proposed Action

Construction Phase

Installation of the project turbines and substation would result in the initial disturbance of approximately 4.6 acres of shortgrass prairie, 25.7 acres of tilled agricultural land, and 6.4 acres of CRP land. Life-of-project disturbance would include disturbance of 0.2 acres of shortgrass prairie, 16 acres of tilled agricultural land, and 0.3 acres of CRP land. Disturbance (both initial and life of project) associated with collector lines, staging areas, access roads, and crane pathes (refer to Table 2.1) would occur on a combination of shortgrass prairie, tilled agricultural land, and CRP. All existing land uses (e.g., dryland farming, livestock grazing, and oil and gas extraction) would continue during the construction phase in the rest of the project area, with the possible exception of hunting. Hunting may be precluded during the construction phase so that construction workers and project facilities such as wind turbines, transformers, and other facilities are not inadvertently harmed by ammunition fired during hunting. This may have a minor effect on a landowner's income, as well as the recreational use of the area by hunters--the income impacts would be more than offset by the rent paid by STW. The reduction in hunting opportunity would be small. Since the project area is entirely located on private land, recreation is generally limited to the landowners themselves or granted to others by the landowners, except for use of the county roads to access walk-in hunt areas (e.g., CRP land). There would be no impacts to recreational facilities in the immediate area.

Traffic would increase on the roads leading to and within the project area during the construction phase as equipment is transported into the area. Large pieces of equipment such as rotor blades are oversized loads that may temporarily slow traffic as they are moved into the project area. This additional heavy traffic would also cause additional wear on existing roads, but transportation would be conducted in accordance with Nebraska Department of Transportation Regulations and Kimball County transportation regulations and, thus, adverse impacts to roads would not occur. Project area roads are crowned, ditched, and graveled, and are capable of supporting heavy loads. Large pieces of agricultural equipment and trucks are common in the project area, so the introduction of additional large equipment associated with the wind project

will have minor impacts on transportation. The increase in traffic will not cause a major change in the transportation network in the project area. STW would prohibit heavy trucks on graveled county roads when conditions are too wet to support traffic without creating ruts greater than 4 inches deep.

O&M Phase

No additional road construction activities would be conducted during the O&M phase of GEI's Proposed Action, and vehicle traffic would be reduced from the volume of traffic experienced during the construction phase. Large pieces of equipment may occasionally impact transportation during the O&M phase, but most O&M traffic will be pick-up trucks and medium-sized trucks similar to those presently used for agricultural activities.

All existing land uses (e.g., dryland farming, livestock grazing, and oil and gas extraction) would continue as they did prior to development, with the possible exception of hunting, which would be precluded in the vicinity of wind turbines, transformers, and other facilities that could be damaged by ammunition fired during hunting. This may have a minor effect on a landowner's income, as well as the recreational use of the area by hunters--the income impacts would likely be offset by lease payments paid by STW. Since the project area is entirely located on private land, recreation is generally limited to the landowners themselves or granted to others by the landowners, except for use of the county roads to access walk-in hunt areas (e.g., CRP land).

No impacts to recreation opportunities would occurduring the O&M phase of the project. Preconstruction land use practices such as farming and livestock grazing would continue during the O&M phase of the project.

Decommissioning Phase

During the decommissioning phase of the Proposed Action, wind turbines, towers, and associated facilities (the substation) would be dismantled and removed from the project area.

Large trucks would transport the various project components from the site using Kimball County Road 59, and the impacts would be similar to those discussed in the construction phase of the Proposed Action. Decommissioning and final site restoration and revegetation would revegetate approximately 54.1 acres to preconstruction land uses such as farming and livestock grazing.

3.9.2.3 Impacts of the No Action Alternative

No additional mitigation, above and beyond the practices listed in Section 2.1.15, are proposed. Under the No Action Alternative, no impacts to land use, transportation, and recreation would occur beyond those that already exist.

3.9.2.4 GEI's Mitigation Measures

Heavy loads would be prohibited on the gravel county roads when conditions are too wet to support traffic without creating ruts greater than 4 inches deep.

3.10 PUBLIC HEALTH AND SAFETY

3.10.1 Environmental Setting for the Proposed Project

Public access to private lands is already restricted by landowners and would continue to be restricted in accordance with easement agreements. This would prohibit the general public from accessing the wind farm facility. Existing safety hazards would include traffic on county roads, potential for fires, possible accidents related to agricultural and recreational (such as hunting) activities, and electric and magnetic (electromagnetic) fields.

3.10.2 Environmental Impacts and Mitigation Measures

3.10.2.1 Impacts of Western's Proposed Action

Western's Proposed Action would result in the installation of certain electrical equipment within the fenced substation area and would interconnect with the existing transmission line. Therefore, there would be no impacts to public health and safety.

3.10.2.2 Impacts of GEI's Proposed Action

The STWF project has been evaluated for potential interference to existing radio transmitters and microwave reflector facilities by the National Telecommunications Information Administration, and it was determined that the U.S. Air Force and Western have crucial communication links within the STWF project boundary. To eliminate potential interference, STW has made appropriate adjustments to the turbine layout. In addition, STW would continue to work with the U.S. Air Force and Western to ensure that the crucial communication links are maintained and that the wind turbines would not interfere with existing communication linkages. Therefore, with continued coordination between the STW, the U.S. Air Force, and Western, there would be no adverse impacts to existing radio transmitters or microwave beam paths as a result of the STWF Project.

Additionally, STW has submitted and received the "determinations of no hazard to air navigation" decision from the FAA for all 40 wind turbines proposed for the STWF Project. The determination of no hazard to air navigation means that the specific locations of the proposed wind turbines would not pose a threat to any airport or to aviation safety in the area. In addition, there are no known military operating areas within or near the STWF project area that could pose a hazard to military flight operations. If, at a later date, STW wants to change the location of any of the wind turbines, STW is required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location. Therefore, the STWF Project would have no adverse impacts to aviation safety in the area.

In addition, an evaluation of potential interference of various radar systems has been completed using the FAA long-range radar tool, and it has been determined that the placement of the wind turbines within the STWF project area would not interfere with the operation of Air Defense and Homeland Security (i.e., long-range radar) or Doppler weather radar (i.e., NEXRAD) systems in the area. Therefore, the STWF Project would have no adverse impacts on various radar systems that serve the general area.

Construction Phase

Traffic accidents and interference with local school buses or emergency vehicles are not anticipated during the construction phase of the project because the county roads are not heavily used in the project area.

STW would also comply with FAA regulations concerning the marking and lighting of the wind turbines. These requirements would minimize impacts to aviation. Specifically, the towers, turbines, and blades would be painted white and FAA lighting would be installed.

The potential for fire or explosion from the construction of wind farms is minimal. In the event a fire were to occur during construction, they would be extinguished immediately by STW personnel, if there is no danger to life or limb, and the appropriate landowner and the county sheriff's department would be notified immediately. Some fire-fighting equipment would be located in vehicles and in the construction staging areas. If the fire cannot be extinguished by STW personnel, the landowner and sheriff would be so advised.

In addition, STW would develop and implement a SPCCP to minimize impacts of the use of hazardous substances. Therefore, there would be minimal impacts to public health and safety.

O&M Phase

The potential for fire or explosion during the O&M phase of the wind energy facility is minimal. Fire deterrents within the wind farm would include access roads, which may serve as fire breaks,

and regular clearing of vegetation from areas around transformers, riser poles, and buildings. In the event a fire were to occur during the O&M phase, it would be extinguished immediately by STW personnel, if there is no danger to life or limb, and the appropriate landowner and the county sheriff's department would be notified immediately. Some fire-fighting equipment would be located in vehicles and in the O&M areas. If the fire cannot be extinguished by STW personnel, the landowner and sheriff would be so advised.

At an electrical substation, there may be a variety of types and applications of power transformers. In order to reduce the likelihood of property damage and the extent of transformer fires, fire barriers walls or separation protection is built into the design of the substation.

Electrical protection for power transformers is accomplished with surge arresters, grounding, bonding, instrumentation, and switch gear. Fuses, switches, circuit breakers, meters, and control power systems are all commonly used in wind energy generating facilities. STW would also implement a SPCCP for the facility to minimize the risk to public health and safety.

Magnetic and electric fields are produced by all electrical equipment, devices, and appliances, including high-voltage transmission lines. The combination of electric and magnetic fields is often referred to as electromagnetic fields. Impacts to human health as a result of the O&M phase of the project would be minimal.

Decommissioning Phase

No additional impacts to public health and safety beyond those discussed under construction impacts are expected to occur during the decommissioning phase of this project. STW would continue to implement a SPCCP for the facility to minimize the risk to public health and safety.

3.10.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, no impacts to public health and safety would occur beyond those that already exist.

3.10.2.4 GEI's Mitigation Measures

All fires would be extinguished immediately by STW personnel, if there is no danger to life or limb, and the appropriate landowner and the county sheriff's department would be notified immediately. Some fire-fighting equipment would be located in vehicles and in the O&M facility. If the fire cannot be extinguished by STW personnel, the landowner and sheriff would be so advised. Fire deterrents within the wind farm would include access roads, which may serve as fire breaks, and regular clearing of vegetation from areas around transformers, riser poles, and buildings.

The substation would be fenced as required for public safety, but no other fencing is proposed at this time.

Safety signage would be posted around all towers, where necessary, transformers, and other high voltage facilities and along roads, in conformance with applicable state and federal regulations.

All project-related drivers would be instructed to yield to school buses and emergency vehicles. In accordance with FAA regulations, STW would submit an individual Notice of Proposed Construction to the FAA for each wind turbine in a preliminary site plan for their review. The FAA completed their review of the preliminary site plan and determined that none of the wind turbines exceed obstruction standards and would not be a hazard to air navigation. STW would comply with FAA marking and lighting guidance presented in FAA Advisory Circular, AC 70/7460-1K, *Obstruction Marking and Lighting* (FAA 2007). To eliminate the need for daytime light, STW would install white towers, turbines, and blades that meet FAA marking requirements. In addition, nighttime lighting of the wind turbines would also comply with FAA guidance. The proposed project would meet all appropriate FAA criteria, so no adverse impacts to aviation would be expected.

In the event that the project results in impact to radar, microwave, television, or radio transmissions, STW will work with the owner of the impacted communication system to resolve

the problem. Potential mitigation may include realigning the existing antenna or installing relays to transmit the signal around the project.

To minimize potential interference to existing radio transmitters and microwave reflector facilities, STW would continue to work with the U.S. Air Force and Western to ensure that the crucial communication links are maintained and that the wind turbines would not interfere with existing communication linkages.

If STW wants to change the location of any of the wind turbines, STW is required by FAA to submit an alteration application and obtain formal approval from FAA prior to making any such change in tower location.

3.11 NOISE

3.11.1 Environmental Setting for the Proposed Project

The A-weighted decibel scale (dBA scale) measures sound levels over the entire range of audible frequencies, weighted to accommodate the fact that humans hear middle range frequencies better than high or low frequencies. The dBA of commonly heard sounds is presented in Table 3.11 and Figure 3.9.

The project area is rural farmland and native prairie, with homesteads, agricultural activities, state and county roads, and a few oil and gas wells, and the wind is the major contributor to ambient noise levels. Noise levels within the project area are likely lowest during the morning and at night when wind speeds are lower, and highest in the afternoon when wind speeds are higher.

For a typical rural environment, background noise is expected to be approximately 40 dBA during the day and 30 dBA at night (BLM 2005). A truck operating at 30 mph generates about 65 dBA at a distance of 300 ft; farm equipment likely is somewhat noisier. Passenger cars traveling 50 mph generate about 65 dBA at 50 ft, and diesel trucks generate about 85 dBA at

Table 3.11 Noise Levels of Commonly Heard Sounds.[1]

Source/Activity	dBA[2]
Threshold of hearing	0
Rural nighttime background	20-40
Wind project at 1,100 ft	35-45
Car at 40 mph at 300 ft	55
Busy office	60
Truck at 30 mph at 300 ft	65
Jet aircraft at 800 ft	105
Threshold of pain	140

1 Source: British Wind Energy Association (2009).
2 dBA = A-weighted decibels.

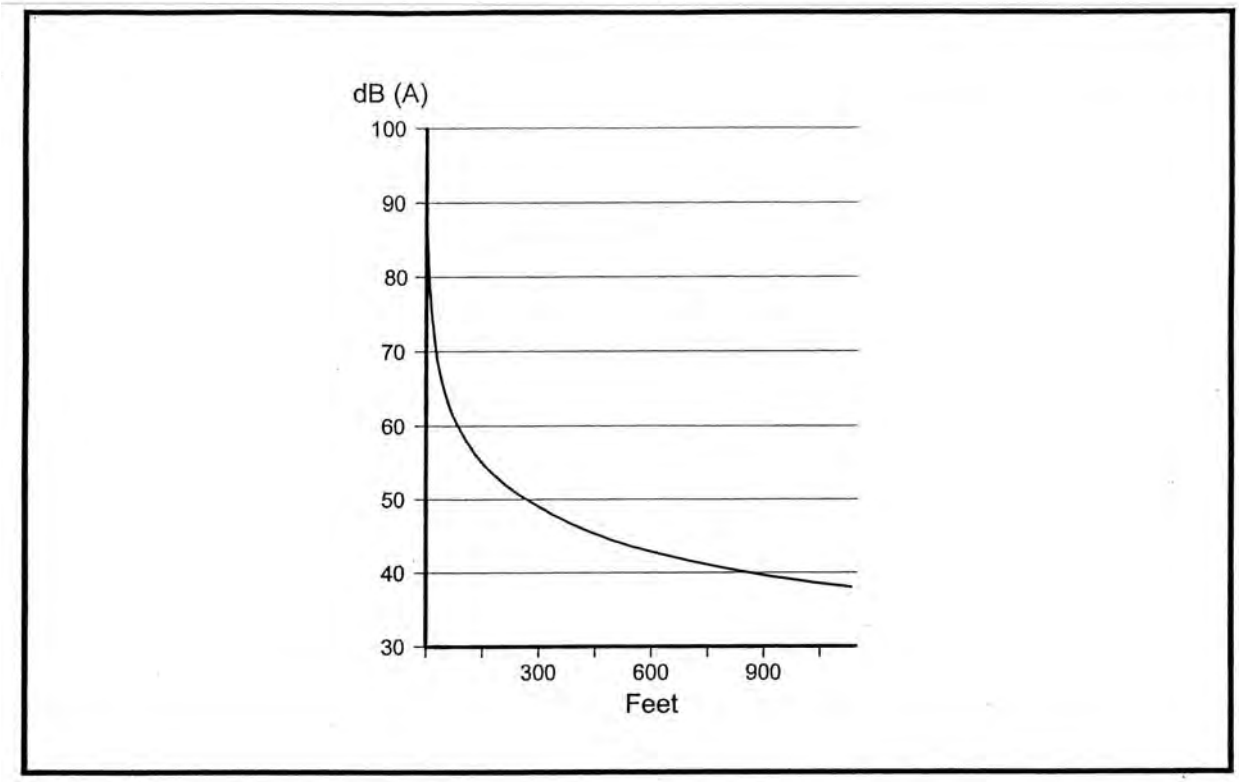


Figure 3.9 Noise Levels and Distance from the Source.

50 ft, so near Kimball County Road 59, traffic noise levels are likely in the range of 65 to 85 dBA.

Noise-sensitive receptors within the project area are residences and wildlife. STW has designed the project so that all turbines are at least 1,200 ft from the nearest residence. The nearest known raptor nest is approximately 1,320 ft from a turbine. The proposed substation would be located greater than 1.0 mi (5,280 ft) from the nearest residence and nearest known raptor nest.

3.11.2 Environmental Impacts and Mitigation Measures

3.11.2.1 Impacts of Western's Proposed Action

There would be no noise associated with installation or operation of Western's electrical equipment and the interconnection; therefore, there would be no increase in noise or excessive vibrations associated with Western's Proposed Action.

3.11.2.2 Impacts of GEI's Proposed Action

Construction Phase

Construction noise may exceed ambient noise levels and may be heard for some distance within the project area. Truck traffic and heavy equipment would cause elevated noise levels at and near construction sites. These impacts may be moderate, probably disrupting residents and wildlife during construction hours, but temporary and similar to noise present as a result of the operation of agricultural equipment throughout the project area. STW will minimize construction noise impacts by ensuring that construction equipment is maintained and properly muffled, limiting the amount of equipment on-site to that which is necessary for construction, and limiting construction activities to daytime hours.

O&M Phase

Noise impacts associated with operations are expected to be minimal to humans. At the base of a wind turbine, it should be possible to have a conversation without raising one's voice (AWEA 2004a). According to the Wind Energy PEIS (BLM 2005), considering geometric spreading, a wind turbine with a sound power level of 104 dBA will have a resulting sound power level of 58 to 62 dBA at a distance of 164 ft from the turbine, which is about the same level as conversational speech at a distance of about 3 ft. At a receptor approximately 2,000 ft away, the equivalent sound pressure level would be approximately 36 to 40 dBA when the wind is blowing, which is typical of background sound levels of rural environment (BLM 2005). Kimball County Zoning and Subdivision Regulation Adopted October 2010 stipulate that no commercial utility wind energy facilities should exceed 50 dBA at the nearest occupied dwelling (Kimball County 2011), and GEI's Proposed Action would not exceed this level.

Both the nearest residence and the nearest known raptor nest are greater than 1,200 ft from the nearest wind turbine, so wind turbine noise levels would be about 38 dBA (refer to Figure 3.8), similar to rural nighttime ambient noise levels.

Most modern wind turbines are pitch-controlled variable-speed, meaning (in part) that the turbine operates at slower speeds in low winds, resulting in much quieter operation in low winds compared to fixed-speed wind turbines (Mujadi and Butterfield 2000). As a result, as wind speed increases, the wind itself masks a portion of the increasing aerodynamic noise (described as blade "swishing" or "whooshing") of the wind turbine (BLM 2005; Rogers et al. 2006). Most of the hum or whine and the thumping noises generated by older model turbines have been eliminated in modern turbines.

Generally, the sound of the wind will mask turbine noise, especially since turbines only operate when wind speeds reach a certain threshold (>8 mph). STW will use state-of-the-art turbines that have been designed to minimize noise levels (e.g., upwind rotors, thinner blade tips, streamlined towers and nacelles), so it is anticipated that wind turbine noise impacts to residents and wildlife would be minimal.

Substations emit both transformer noise and switchgear noise. Transformers emit a low-frequency humming noise (caused by vibrations within the transformer) that is generally between 43 dBA (for a 60-MW project) at a distance of about 500 ft (BLM 2004). Substation noise at 150 ft for a 160-MW project (slightly larger than the full build-out) would be about 46 dBA. These noise levels at about 1,640 ft would be 33 and 36 dBA, respectively, so substation noise levels at the nearest residence and nearest known raptor nest would be below ambient levels.

Decommissioning Phase

Sound levels in the project area would be affected temporarily (<1 year) by decommissioning activities such as equipment operation and movement, but due to the remote nature of the site, impacts are not anticipated to affect any residences or businesses.

The largest source of noise during decommissioning operations would be diesel-powered equipment. Therefore, all equipment will be operated with the manufacturer's suggested noise control systems (e.g., mufflers and noise dampening during the decommissioning phase of the materials), and all decommissioning operations will take place during daylight hours. The STWF Project is expected to have limited noise impacts inside or outside of the project area and would not exceed a 10 dBA increase compared to the background noise level.

3.11.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, there would be no impacts to noise beyond those that already exist.

3.11.2.4 GEI's Mitigation Measures

All vehicles and construction equipment would be properly muffled to minimize noise.

3.12 VISUAL RESOURCES

3.12.1 Environmental Setting of the Proposed Project

The project area exhibits a typical rural setting with both occupied and abandoned farmsteads scattered along gravel roads throughout the landscape, which is a mixture of tilled and CRP agricultural fields and native grassland used as pasture. Many farmsteads have shelterbelts around the perimeter. The existing Peetz Wind Farm is located approximately 10 mi south of the proposed STWF and is readily visible from all locations within the STWF project area. The landscape is characteristically flat to rolling, with the green and brown colors of the agricultural fields, linear features such as roads and transmission lines, and it is punctuated with the galvanized steel of grain elevators. The visual elements of proposed project area are quite common in the Nebraska panhandle. There are no visually sensitive areas within or near the STWF project area. A viewshed map was created for the project, and it illustrates which areas would be able to see the wind turbines within 10 mi of the project boundary (Figure 3.10).

3.12.2 Environmental Impacts and Mitigation

3.12.2.1 Impacts of Western's Proposed Action

All interconnection components would be housed in a substation area and will not be readily visible, and there would be no degradation of the visual aspects of the existing landscape; therefore, Western's Proposed Action would have no impacts to visual resources.

3.12.2.2 Impacts of GEI's Proposed Action

The wind turbines would change the aesthetics of the landscape with the addition of more tall towers and rotating blades--whether this effect is deemed beneficial or adverse depends on viewer perspective and sensitivity. Based on the viewshed map (refer to Figure 3.9) and local topography, the wind turbine would not be visible from Kimball, Potter, or I-80. However, the turbines would be visible from the community of Dix about 5 mi north of the STWF project area.

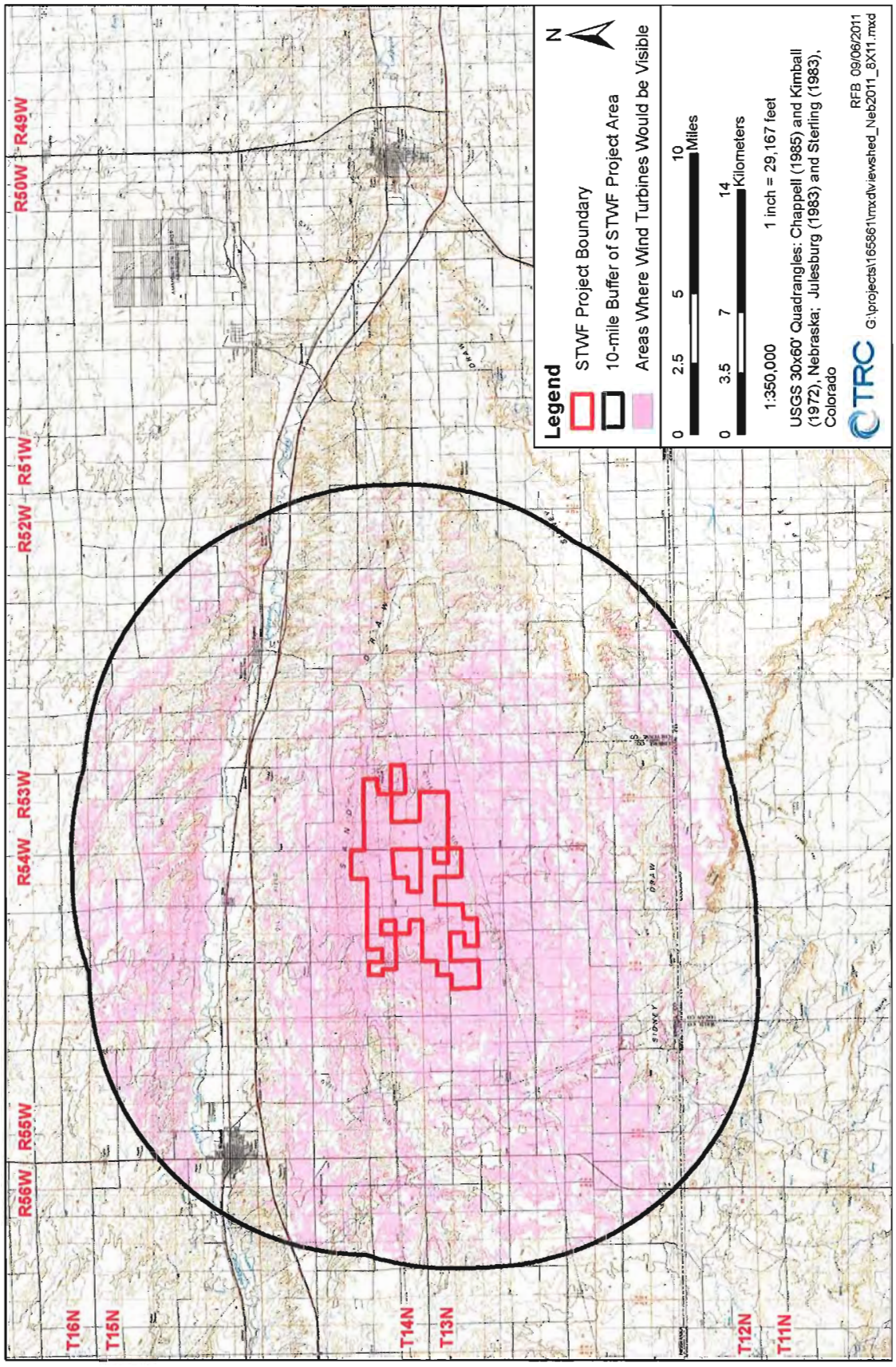


Figure 3.10 Ten-mile Viewshed of STWF Project Area.

The substation, access roads, overhead power lines, vehicles, and dust would also be visible in the project area. The substation would be viewed most frequently by local landowners, and it would represent an industrial facility in a rural landscape. During construction, vehicles and dust would be a fairly constant presence in the project area. During operation, vehicle traffic would be only slightly more than current traffic levels.

Western and STW received no information during the scoping process, open house meeting, or agency meetings that indicate potential visual resource issues or concerns. The STWF Project is located entirely on land of participating landowners, and the community response during the open house was uniformly supportive of the STWF Project.

The AWEA recently sponsored a series of meetings to develop recommendations improving aviation safety while allowing wind development to proceed (AWEA 2004b). Current FAA requirements for wind turbine lighting typically includes red simultaneously pulsating nighttime lighting and no daytime lighting (white towers are sufficiently conspicuous to pilots). Red nighttime lights are less intrusive to humans than white nighttime lights (AWEA 2004b). STW is preparing a lighting plan to meet FAA requirements while minimizing the number of lights for the project. Typically, not all turbines would be lit; rather, turbines at the end of each string and the third orforth turbine in a string would be lit.

3.12.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, there would be no impacts to visual resources beyond those that already exist.

3.12.2.4 GEI's Mitigation Measures

No mitigation measures for GEI's Proposed Action are recommended for visual resources.

3.13 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.13.1 Environmental Setting for the Proposed Project

For the purpose of this EA, the area of potential effect for socioeconomic impacts includes the towns of Kimball in Kimball County and Potter in Cheyenne County, Nebraska.

The project area is located southeast of Kimball, in Kimball County, Nebraska. In 2000, the population of Kimball was 2,559 (U.S. Census Bureau 2011). The town contains 1,210 housing units, with 1,110 households and 700 residing families. The population is predominantly white (96.2%); minorities make up 7.4% of the population, the demographic data for minorities include white and non-white Hispanics and Latinos, so totals will be more than 100%. Median age is 43 years. Median household income is $29,984; median family income is $37,273. Per capita income is $18,762. An estimated 7.3% of the population and 4.3% of families are below poverty level.

Potter is a village in Cheyenne County, Nebraska, is located northeast of the project area. In 2000, Potter's population was 390 (U.S. Census Bureau 2011). Potter has 170 housing units with 159 households and 104 families residing in the city. The population is predominantly white (97.9%), with 2.1% minorities. Median age is 35 years. Median household income is $28,750, median family income is $37,000, and per capita income is $14,344. An estimated 17.8% of the population and 13.5% of the families are below poverty level.

Farm households have substantially higher levels of job-related skills than nonfarming households, including welding, small and large engine repair, computer use, large and small animal care, agriculture/gardening, and machining.

Each federal agency is to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (Executive Order 12898, Federal Actions to Address Environmental Justice

in Minority Populations and Low-Income Populations, February 1994, 59 *Federal Register* [FR] 7629).

The Presidential Memorandum accompanying the Executive Order directs federal agencies to "analyze the environmental effects, including human health, economic and social effects of Federal actions, including effects on minority communities and low-income communities when such analysis is required by the *National Environmental Policy Act*."

EPA defines environmental justice as "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies."

In addition, the Council on Environmental Quality provides input on NEPA compliance with Executive Order 12898 in its Environmental Justice Guidance under NEPA, December 1997.

Low-income communities are defined by EPA as communities where the percentage of the population below poverty level is greater than the state average. Currently, 25.7% of Nebraska's population is below poverty level. In Kimball, only 7.9% is below the poverty level. In Potter, 17.8% of the population is below the poverty line, so Potter would be considered a low-income community.

Minority communities are defined by EPA as communities where the percent of minorities is larger than the state average. Nebraska's minorities make up 18% of the state's population. Minorities make up 8% of Kimball population. The minority population of Potter is 6%.

Therefore, based on these data, substantial minority and low-income populations do not exist within the analysis area, and Environmental Justice issues are not discussed further in this EA.

3.13.2 Environmental Impacts and Mitigation Measures

3.13.2.1 Impacts of Western's Proposed Action

Western's Proposed Action would require a limited number of employees to install the interconnection components in the substation; therefore, there would be no adverse impacts to the social and economics of the communities as a result of Western's Proposed Action.

3.13.2.2 Impacts of GEI's Proposed Action

Construction Phase

Construction of the 60-MW project would require approximately 45 people per day during the construction period (a total of approximately 4 to 6 months). Reclamation would require about five people. Construction crews would likely work 10- to 12-hour work days, 6 days per week. Turbine erection, including foundations and tower wiring, would take an estimated 16 weeks to complete, with erection and foundation installation activities overlapping. Substation construction would occur over a 12-week period, and O&M building construction is estimated to take about 6 weeks. Reclamation would require about four people for 30 days.

Approximately 40% of the work force would be STW employees or contractors, and about 27 workers, or 60% of the work force, would be local hires. Most construction workers are expected to commute from Kimball and Sidney, Nebraska, and possibly Cheyenne, Wyoming, and surrounding areas. Kimball has 222 vacant housing units and over 87 hotel rooms (U.S. Census Bureau 2011). Sidney has 273 vacant housing units and over 357 hotel rooms (U.S. Census Bureau 2011). There is adequate housing and associated infrastructure to support the 45 additional workers during the construction period, and no new infrastructure would be required for the temporary construction workers.

GEI's Proposed Action is expected to result in favorable impacts to social and economic values near the project area with the creation of additional jobs.

O&M Phase

The project would generate sales and use taxes for goods and services purchased during construction and operation (Table 3.12). It would also provide property taxes to the town of Kimball and to Kimball County. The project would create 8-10 permanent O&M jobs. All of these impacts would be beneficial to the affected towns/cities, to Kimball County, and to the State of Nebraska. The project is expected to generate revenue needed by the county and the city. Furthermore, the project would generate revenue for the private landowners on whose land the project is located, further benefiting the area's economy.

During the O&M phase of GEI's Proposed Action favorable impacts to social and economic values near the project area with the creation of additional jobs.

Decommissioning Phase

Based on a 30-year life of project, decommissioning of the STWF Project is expected to start in 2042 and would be completed in a 1-year period. Based on the number of direct construction jobs required to construct this project, it is estimated that approximately one-half of the number of direct jobs required during the construction phase would be required during the decommissioning phase. Based on this assumption, approximately 23 local-hire jobs would be

Table 3.12 Expected Revenues to Local Landowners and Governments from the Proposed Project.

Source of Revenue/Benefit	Estimated Amount of Revenue/Benefit (Life of Project)
State sales taxes	$4,000,000/year
County revenue	$215,000/year
Landowner income	$250,000/year
Construction employment	45 temporary full-time jobs (27 local hires)
O&M employment	8-10 permanent full-time jobs

created in 2042. STWF estimates that approximately 80% of the decommissioning jobs would be filled by local workers, and no new infrastructure would be required.

No additional property taxes are expected to be generated during the decommissioning phase of the project.

During the decommissioning phase of GEI's Proposed Action would result in favorable impacts to social and economic values near the project area with the creation of additional jobs.

3.13.2.3 Impacts of the No Action Alternative

Under the No Action Alternative, the affected towns/cities, Kimball County, and the State of Nebraska would not realize the sales and use or property taxes potentially generated by the wind project, and private landowners would not realize the additional income from easements on their property.

3.13.2.4 GEI's Mitigation Measures

No mitigation measures for GEI's Proposed Action are recommended for socioeconomics.

3.14 CUMULATIVE IMPACTS

3.14.1 Cumulative Impacts of Western's Proposed Action

No cumulative impacts are expected from Western's Proposed Action because no impacts such as surface disturbance or noise would occur as a result of the interconnection with the existing Sidney-Archer transmission line.

3.14.2 Cumulative Impacts of GEI's Proposed Action

Cumulative impacts are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor to a group of collective actions taking place over a period of time.

The natural, human, and cultural environment within the project area and in the general region has been substantially altered by the long-practiced agricultural activities, especially crop production, which is widespread in the project area. The major agricultural activities have resulted in widespread conversion of shortgrass prairie to farmland and rural residential development. Other developments that have affected the region include the 430-MW Peetz Table Wind Project, located about 10 mi south of the STWF project area; the 10.6-MW Municipal Energy Agency of Nebraska's Kimball Wind Farm, located about 2 mi northwest of Kimball, Nebraska; transportation (roads, highways, railroads, pipelines, transmission lines); small towns with businesses to provide goods and services to the rural communities; and water development (e.g., irrigation ditches, wind mills, stock ponds). Western's 115-kV Sidney-Archer transmission line bisects the project area. Other wind developments may be leasing land within the region, but no applications have been filed with Kimball County (personal communication, September 6, 2011, with Sheila Newell, Interim Zoning Administer, Kimball County), so specific development plans are not currently known. No known reasonably foreseeable future wind development is proposed in the immediate project area.

Therefore, the cumulative impacts assessment includes GEI's Proposed Action and the above-referenced management activities and developments.

3.14.2.1 Climate and Air Quality

Cumulative impacts to climate and air quality would be similar to those described for GEI's Proposed Action. Climate would not be incrementally impacted by the project. The largest

concentrations of PM, CO, SO_2, NO_x, VOCs, and HAP emissions would likely occur during the construction phase of this project and would be associated with ground-disturbing activities. Emissions would then be reduced during the subsequent O&M phase and decommissioning phase. The cumulative impacts of changes in these pollutant concentrations are likely to have minimal effect on the near-field, far-field, and cumulative concentrations of these pollutants.

Cumulative effects of this wind project would produce electric power from a nonpolluting source, resulting in a small incremental improvement in air quality when compared to burning coal for electric power. However, the air quality improvement would not necessarily occur within the project area.

Cumulative impacts on air quality with the addition of this project to the airshed are likely to be negligible over the life of the project. The impacts of emissions from fugitive dust and combustion sources during the construction, O&M, and decommissioning phase are negligible, and air emissions from wind generation of electricity are near zero.

3.14.2.2 Geology, Paleontology, and Soils

Cumulative impacts to geology would include excavation in bedrock to dig the turbine foundations, as described for GEI's Proposed Action.

Other excavation in the Ogallala formation has the potential to impact paleontologic resources, and the project would contribute minimally to cumulative impacts on paleontology. If the project is determined not likely to uncover important fossils, cumulative impacts would be minor. However, there is potential to uncover scientifically important fossils, so excavation would be monitored by a qualified paleontologist, any discoveries would be recorded and preserved, as appropriate, and impacts would be beneficial due to the contribution to the paleontological record.

Soils have already been highly impacted by farming and other agricultural activities. The proposed project would disturb up to 259.9 acres of soils, most of which are already disturbed by agricultural activities.

3.14.2.3 Water Resources

Cumulative impacts to surface water quantity would be minimal because any surface waters used would be obtained from existing permitted sources and would not impact other water users. The amount of surface water used would be minor compared to the amount used regionally for irrigation (Topper et al. 2003). Cumulative impacts to surface water quality are already largely affected by agricultural activities, including wind and water erosion from plowed fields and irrigation return water. Dust from traffic on the area's gravel roads and railroads, maintenance on the pipelines and power lines, and residential and commercial activities (including O&M on the existing wind project) all contribute small amounts of sediment to surface waters. The project would result in the disturbance of up to 259.9 acres during construction; however, STW would use best management practices (including a SWPPP and SPCCP) to minimize erosion, downstream sedimentation, and groundwater contamination, so the incremental impact to surface water and groundwater quality would be minimal.

Existing wells in the project area are used for irrigation, stock watering, and domestic use. The project would consume 26.5 acre-ft of water (surface and/or ground water) from existing permitted sources for foundation concrete and dust control during construction (see Section 2.2.7). The project would contribute only slightly to groundwater consumption. Groundwater quality in the project area would not be impacted, and cumulative groundwater quantity or quality impacts are anticipated to be minimal.

3.14.2.4 Floodplains and Wetlands

The project would not impact any floodplains or wetlands. As noted in Section 3.4, many floodplains and wetlands within the project area are farmed and thus previously impacted.

3.14.2.5 Vegetation

Vegetation within the project area is largely cropland (6,187 acres), areas of native prairie/rangeland (3,541 acres), and CRP land (1,555 acres). Installation of the turbines and substation would temporarily disturb up to 259.9 acres of vegetation, of which 5.9 acres would be native prairie, 50.4 acres would be cropland, and 1.8 acres would be CRP land. The remaining 201.8 acres of disturbance associated with collector lines and access roads would be revegetated so that life-of-project disturbance would be 54.1 acres.

3.14.2.6 Wildlife

Cumulative impacts to wildlife would be similar to those described for GEI's Proposed Action because land use within and adjacent to the project area is subject to regular human activity from farming and ranching activities. Large tracts of native habitat have been replaced with cropland, which provides nonnative habitat for some species while displacing other species. The CRP land, rangeland, and grasslands in the region provide habitat for a wide number of species; however, existing human disturbance and activity adversely impact some species. Mountain plover and swift fox are shortgrass prairie species that are now state-listed species due to widespread loss of shortgrass prairie habitat. Installation of the turbines and substation would temporarily disturb up to 259.9 acres of vegetation, of which 5.9 acres would be native prairie, 50.4 acres would be cropland, and 1.8 acres would be CRP land. The remaining 201.8 acres of disturbance associated with collector lines and access roads would be revegetated so that life of project disturbance would be 54.1 acres. No trees would be removed as a result of the project, and cliff areas would not be disturbed; therefore, no raptor nesting habitat would be lost as a result of the project.

Direct cumulative impacts to birds (i.e., collision-related mortality) would result from the presence of aboveground features such as communications towers, grain elevators, transmission lines, vehicles on highways, windows, and the two wind projects, as well as mortality caused by other factors (e.g., house cats) (National Wind Coordinating Committee [NWCC] 2001). However, mortalities at wind projects has been documented to be low compared with other

sources of mortality (NWCC 2001), and, while the projects probably would cause some mortality, collisions are not anticipated to result in population level impacts.

3.14.2.7 Federal- and State-listed Species

Cumulative impacts to federal- and state-listed species would be similar to those described for GEI's Proposed Action. All federal development activities must comply with the *Endangered Species Act*, which requires avoidance or mitigation for impacts to TEPC species, so no significant cumulative impacts to TEPC species would occur. No TEPC species would be impacted by the project. The CRP land, rangeland, and grasslands in the region provide habitat for a wide number of species; however, existing human disturbance and activity adversely impact some species. Mountain plover and swift fox are shortgrass prairie species that are now state-listed species due to widespread loss of shortgrass prairie habitat. The project would temporarily disturb up to 259.9 acres of habitat, of which 5.9 acres would be native prairie, 50.4 acres would be cropland, and 1.8 acres would be CRP land. Cumulatively, the region's agricultural activities have had greater impact on habitat than other developments, and most of the project's disturbance would occur on previously disturbed land, so GEI's Proposed Action would not cause a species to be petitioned for listing under the *Endangered Species Act*.

3.14.2.8 Cultural Resources

No NRHP-eligible cultural resource sites would be adversely impacted by GEI's Proposed Action or other projects that have a federal nexus during the current proposed project.

3.14.2.9 Land Use, Transportation, and Recreation

Wind power generation also occurs as a land use to the north, south, and northwest of Kimball, so the proposed project would add incrementally to the extent of renewable electric generation in the area. Other land uses would be impacted only slightly (e.g., a temporary disturbance of about 259.9 acres of cropland, CRP land, and native prairie) and cumulatively, would not be result in an adverse affect to land use. Traffic would increase, but the overall transportation system

should be able to handle project-related traffic along with the other uses without an adverse effect. Recreational opportunities are presently controlled and will continue to be controlled by the private landowners and, thus, the project would not cause cumulative impacts to recreation.

3.14.2.10 Noise

Noise impacts are anticipated to be negligible, such that GEI's Proposed Action would comply with Kimball County regulations. In addition, there are no major existing noise generation sources in the general area.

3.14.2.11 Visual Resources

Cumulative impacts to visual resources would be similar to those described for GEI's Proposed Action. The project would be the third wind project in the general area and, thus, is compatible with the existing landscape.

3.14.2.12 Socioeconomics and Environmental Justice

The project's socioeconomic impacts would be beneficial to the local landowners, the city of Kimball, neighboring cities, Kimball County, and the State of Nebraska. Cumulative impacts also would be beneficial. Cumulative development in the general area would not impact any low-income or minority communities because no minority communities, as defined by EPA, occur in the region. The overall economic impact of the Proposed Action would be increased economic activity in the area and a benefit to the area.

3.15 UNAVOIDABLE ADVERSE EFFECTS

3.15.1 Western's Proposed Action

Western's Proposed Action would result in no unavoidable adverse effects.

3.15.2 GEI's Proposed Action

The mitigation measures incorporated in GEI's Proposed Action and within the various mitigation sections in this chapter would avoid or minimize most of the potential adverse effects. Unavoidable adverse effects--residual impacts that would likely remain after mitigation--would include the following:

- Fossils fuels and water would be consumed, and labor and materials would be expended during construction and, to a much lesser extent, during operation (e.g., O&M vehicle fuel). This would be offset by renewable energy produced through wind rather than consumption of fossil fuel.
- Some damage to, or illegal collection of, paleontological or cultural resources may occur.
- Up to 259.9 acres of soil and vegetation temporary disturbance would occur, resulting in some soil loss and some stream sedimentation, until surface-disturbed areas are successfully reclaimed. Up to 54.1 acres of vegetation would be disturbed for the life of project.
- Some additional emissions of fugitive dust, sulfur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, and volatile organic compounds would occur.
- Some wildlife mortality would occur.

3.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

3.16.1 Western's Proposed Action

Western's Proposed Action would require the use of energy to install the interconnection components but there would be no irreversible or irretrievable of other resources.

3.16.2 GEI's Proposed Action

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible

effects primarily result from use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. An irreversible commitment of resources represents a loss of future options. It applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity.

Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site). Irretrievable commitments represent the loss of production, harvest, or use of renewable resources. These opportunities are foregone for the period of GEI's Proposed Action, during which other resource utilization cannot be realized. These commitments may be reversible, but the foregone utilization opportunities are irretrievable.

An irreversible and irretrievable commitment of resources would include the loss of soil resources as a result of wind and water erosion, the temporary loss of productivity (i.e., forage, wildlife habitat) from lands directly impacts by GEI's Proposed Action, the loss of alternative land uses for lands included in GEI's Proposed Action, the inadvertent or accidental destruction or loss of cultural or paleontological resources, the loss of individual mammals and birds, and the loss fossil fuels and raw materials (including steel, concrete, water, etc.) used to construction GEI's Proposed Action.

3.17 INTENTIONAL DESTRUCTIVE ACTS

Infrastructure such as the wind project may be the subject of intentional destructive acts ranging from vandalism and theft to sabotage and acts of terrorism intended to disable a line or project. The former, more minor, type of act is far more likely for such types of projects in general and particularly for those like GEI's Proposed Action, which are in relatively remote areas and serve relatively small populations. Intentional sabotage or terrorist acts would be expected to target much larger electrical facilities, where a loss of service would have substantial regional impacts.

Theft is most likely to involve substation and switchyard equipment that contains salvageable metal (e.g., copper and aluminum) when raw or scrap metal prices are high. Vandalism, on the other hand, is more likely to take place in relatively remote areas and perhaps more likely to involve acts of opportunity (e.g., shooting out transmission line insulators, shooting at the blades on a wind generator, etc.) than premeditated acts. Protections against theft include fencing around substations and the use of locks and alarm systems where expensive or dangerous equipment is housed. The presence and danger of high voltage would also likely discourage theft and vandalism. Vigorous prosecution of thieves and monitoring of metal recycling operations might also deter the theft of equipment. Similarly, the prosecution of vandals who have damaged or destroyed project equipment might discourage vandalism if it becomes a problem.

With respect to GEI's and Western's Proposed Actions, certain project facilities, such as the substations, would be protected from theft and vandalism by fencing and alarm systems. The presence of high voltage would also serve as a deterrent to casual attacks. The relatively remote location of the proposed project would tend to reduce vandalism on the whole because of the small number of people who would be expected to encounter the facilities. However, this same remoteness might encourage a rare act of opportunistic vandalism. Such occurrences are expected to be infrequent and would be vigorously investigated and prosecuted to discourage further acts.

The effects of intentional destructive acts could be wide ranging or more localized, depending on the nature and location of the acts and the size of the project, and would be similar to outages caused by natural phenomena such as storms and ice buildup. While a transmission line is out of service, some residences may lose electrical service. Electrical appliances would be nonfunctional until electrical service was restored. In such cases, perishable food could spoil, and residents would be inconvenienced and could experience discomfort during cold or hot weather. However, some residents may already have backup generators and alternate means of cooking and heating. Also, if the residences are supplied with electricity from two or more sources, there may be no noticeable interruption or only minor temporary interruptions if the alternate sources were not impacted.

Effects on commercial and industrial electricity users would similarly include loss of lighting and ventilation but could also include the shutdown of office equipment, computers, cash registers, elevators, heavy machinery, food preparation equipment, and refrigeration. Some commercial operations might be forced to shut down temporarily as a result of a loss of power or concerns about safety. Municipalities could be affected by loss of traffic signals, while city offices might have to close temporarily. Police and fire services could be affected if communication systems shut down. City services, such as sewer and water systems, might be affected by extended outages. Loss of electrical service at hospitals would be of special concern because it could be life threatening. Such effects might be mitigated at hospitals and for other critical uses through the use of temporary backup power (e.g., from a diesel- or gas-powered generator). In addition to the effects from loss of service, destructive acts could cause environmental effects as a result of damage to the facilities. Two such possible effects are fire, should conductors or power lines come in contact with combustible materials, and oil spills from equipment (e.g., mineral oil in transformers) in the substations, should some of that equipment be damaged or breached. Fires would be fought in the same manner at those caused by, for example, an electrical storm. Any spills would be treated by removing and properly disposing of contaminated soil and replacing it with clean soil.

4.0 CONSULTATION AND COORDINATION

4.1 PUBLIC PARTICIPATION

As indicated in Section 1.6, an open process has been employed for the determination and scope of the issues addressed in this environmental document. Public scoping was conducted in compliance with the procedural requirements of the CEQ rules and regulations for the implementation of NEPA (40 C.F.R. 15001.7) and DOE NEPA policies (U.S. DOE 2004).

After reviewing GEI's Proposed Action, Western made a decision to prepare an EA for this project (Appendix A). A scoping statement was released by the Western on June 3, 2011, in order to identify the issues related to the proposed project. The scoping statement was sent to those government offices, elected officials, public land users, and user groups identified as having a potential interest in the proposed project (refer to Appendix A). The mailing list is provided in Table 4.1. The scoping statement included the mailing list and notice of a public meeting scheduled for June 14, 2011, at the Kimball Events Center, Kimball, Nebraska. STW held a public meeting with representatives from Western. The STWF project team was available to meet with interested members of the public to discuss the EA activities and the project in general. Approximately 40 people were in attendance and were supportive of the project. No public comments were submitted for the project.

Conference calls with the STWF project team, Western, the Nebraska Department of Game and Parks, and USFWS, were conducted on May 26 and July 14, 2011, to discuss specific wildlife issues for the development of the site. The issues identified during the public scoping and agency consultation include:

- impacts to Nebraska state-sensitive species such as the swift fox and mountain plover;
- impacts to avian and bat species; and
- impacts to golden eagles.

Table 4.1 EA Scoping Notice Mailing List.

Name	Affiliation
Agencies	
Robert Harms	U.S. Fish and Wildlife Service
Michelle Koch	Nebraska Game Fish and Parks Commission
--	Nebraska State Historic Preservation Office/Nebraska State Historical Society
Tracy Rosgen	Federal Aviation Administration
David A. Bashaw	Kimball County Commissioner
Larry Brower	Kimball County Commissioner
Larry Engstrom	Kimball County Commissioner
M. Timothy Nolting	Kimball County Zoning
Sheila Newell	Kimball County Planning
David L. Wilson	Kimball County Attorney
Cathleen A. Sibal	Kimball County Clerk
Harry Gillway	Kimball County Emergency Manager
Debora Huff	Kimball County Assessor
Jerry Robbins	Kimball County Highway Superintendent
Harry J. Gillway	Kimball County Sheriff
Donald Brush	Kimball County Surveyor
Diana Quicke	Kimball County Treasurer
Jerry Robbins	Kimball County Weed Superintendent
--	City of Kimball Library
--	City of Kimball Post Office
Susan Lockwood	Kimball County NRCS
Robert Nagel	Kimball County FSA
Affected or Adjacent Landowner	
David A. Bashaw	Citizen
Jim Bertramson	Citizen
Deanna J. Biesecker	Citizen
Christopher J. Bogert	Citizen
Elmer Bogert	Citizen
Cheryl A. Bohlender	Citizen
Martha G. Bonds	Citizen
Kent R. Brauer	Citizen

Table 4.1 (Continued)

Name	Affiliation
Dewey Brothers	Citizen
Gayann S. Collard	Citizen
Dona L. Dailey	Citizen
Mark A. Daum	Citizen
Mitchell J. Daum	Citizen
Nicholas J. Daum	Citizen
Gregory J. Davis	Citizen
James A. Davis	Citizen
Robbye F. Davis	Citizen
Anita Jane Dedic	Citizen
Larry D. Dedic	Citizen
Amy A. Dugdale	Citizen
Jill Ellis	Citizen
Richard Endacott	Citizen
Gary Haack	Citizen
Lloyd J. Haack	Citizen
Daniel R. Hafeman	Citizen
Kathryn M. Hafeman	Citizen
Bryce A. Halstead	Citizen
Lois Jean Halstead	Citizen
Mark A. Halstead	Citizen
Lucille S. Harrison	Citizen
Myrna Heldenbrand	Citizen
Andrew Hollenbeck	Citizen
Michael B. Jewell	Citizen
Kai-Joseph Kemnitz	Citizen
Betty L. Kenton	Citizen
Robert C. Kessler	Citizen
Mary Katharine Lindsay	Citizen
Shaun Patrick Madden	Citizen
Shirley M. Madden	Citizen
Shirley A. Mathewson	Citizen
Kent E. Mowrer	Citizen

Table 4.1 (Continued)

Name	Affiliation
Richard K. Mowrer	Citizen
Betty J. Nelson	Citizen
Dorothy M. Nelson	Citizen
R. Peggy Nelson	Citizen
Rick W. Nelson	Citizen
Betty Jane Newell	Citizen
Joseph E. Nicklas	Citizen
Roslyn J. Pearson	Citizen
Carl David Reader	Citizen
Thomas W. Reader	Citizen
Hugh A. Roberts	Citizen
John S. Roberts	Citizen
Patricia Kenton Sampson	Citizen
Elaine M. Scheele	Citizen
Lonnie L. Scheele	Citizen
Brad Sims	Citizen
Kirsten Sims	Citizen
JoAnn M. Steele	Citizen
James W. Stewart	Citizen
Lyle P. Stewart	Citizen
Weldon L. Stewart	Citizen
Marvin Thompson	Citizen
Robert J. Thompson	Citizen

4.2 LIST OF PREPARERS

Table 4.2 identifies those companies and associated personnel responsible for the preparation of the EA.

Table 4.2 List of EA Preparers.

Name	Company Affiliation	Responsibility
Rod O'Sullivan	Western Area Power Administration	NEPA Coordination, Lead Federal Agency
Misti Shriner	Western Area Power Administration	Wildlife Biologist
Ree Rodgers	Western Area Power Administration	Cultural Resource Specialist
Claire Douthit	Western Area Power Administration	Legal Review
Jan Hart	TRC Environmental Corporation	Project Manager, EA preparation
Scott Kamber	TRC Environmental Corporation	Air Quality, Visual Resources and Quality Assurance
Randy Blake	TRC Environmental Corporation	Geological Information System (GIS) Mapping, visual tool
Rena Merritt	TRC Environmental Corporation	Socioeconomic
Betty Wills	TRC Environmental Corporation	GIS and AutoCad
Diane Thomas	TRC Environmental Corporation	Wildlife
James Lowe	TRC Environmental Corporation	Cultural resources
Genial DeCastro	TRC Environmental Corporation	Document production
Jessica Robinson	TRC Environmental Corporation	Technical editing
Danny McCrystal	Generation Energy	Project Description
Karl Keller	Generation Energy	CRP, Land Use, general background
Bernie Krantz	Bechtel Development Company	Project Design and Engineering

This page is intentionally left blank.

5.0 REFERENCES

American Wind Energy Association. 1995. Avian interactions with wind facilities: A summary. Prepared by Colson & Associates for American Wind Energy Association, Washington, D.C.

_____. 2004a. Wind energy fact sheet: Facts about wind energy and noise. <http://www.awea.org/pubs/factsheets/WE_Noise.pdf>. Accessed December 2004.

_____. 2004b. Wind turbine lighting. Wind Energy Fact Sheet. 1 pp.

Arnett, E.B., D.B. Inkley, D.H. Johnson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland.

Arnett, E.B., W.K. Brown, W.P. Erickson, J.K. Fieldler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T.J. O'Connell, M.D. Piorkowski, and R.D. Tankersly, Jr. 2008. Patterns of bat fatalities at wind energy facilities in North America. Journal of Wildlife Management 72(1):61-78.

Avian Power Line Interaction Committee. 2006. Suggested practices for raptor protection on power lines: The state of the art in 2006. Edison Electric Institute and the Raptor Research Foundation, Washington, D.C.

Baerwald, E. 2006. Bat fatalities in Southern Alberta. Presented at the Wildlife Research Meeting VI, San Antonio, Texas. National Wind Coordinating Collaborative. November 2006.

Baerwald, E.F., G.H. D'Amours, B.J. Klug, and R. Barclay. 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. Current Biology 18(16):R695-R696.

Bat Conservation International, Inc. 2011. Bat species: U.S. bats. Bat Conservation International, Inc., Austin, Texas. <www.batcon.org>. Accessed September 13, 2011.

Beason, R.C. 1995. Horned lark (*Eremophila alpestris*). *In* The birds of North America, No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D.C.

Bjorklund, L.J. 1957. Geology and groundwater resources of the Lower Lodgepole Creek Drainage Basin, Nebraska. U.S. Geologic Survey Water-Supply Paper 1410, pp. 1-76.

British Wind Energy Association. 2011. Noise from wind turbines: The facts. <http://www.bwea.com/ref/noise.html>. Accessed September 13, 2011.

Bureau of Land Management. 1995. Draft Kenetech/PacifiCorp windpower project environmental impact statement. U.S. Department of the Interior, Bureau of Land Management, Rawlins District. 322 pp. + append.

_____. 2004. Draft programmatic environmental impact statement on wind energy development on BLM-administered lands in the western United States. U.S. Department of the Interior, Bureau of Land Management. DES 0441. September 2004.

_____. 2005. FES 05-11; final programmatic environmental impact statement on wind energy development on BLM-administered lands in the western United States and record of decision. United States Department of the Interior, Washington, D.C. June.

Cassiliano, M. 1980. Stratigraphy and vertebrate paleontology of the Horse Creek-Trail Creek area, Laramie County, Wyoming. Contributions to Geology, University of Wyoming, v. 19, pp. 25-68.

Committee on Environmental Impacts of Wind Energy Projects. 2007. Environmental impacts of wind-energy projects. Committee on Environmental Impacts of Wind-Energy Projects, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies. National Research Council of the National Academies. The National Academies Press, Washington, D.C. 394 pp.

Darton, N.H. 1899. Preliminary report on the geology and water resources of Nebraska, west of the one hundred and third meridian. U.S. Geologic Survey, 19th Annual Report, pt. 4, pp. 719-785.

Diffendal, R.F. 1990. The Sidney Gravel and Kimball Formation: Supposed parts of the Ogallala Group (Neogene) are not objectively mappable units. Papers in Natural Resources, University of Nebraska School of Natural Resources, pp. 1-19.

Dinsmore, J.J. 1983. Mountain Plover (*Charadrius montanus*). *In* Impacts of Coal Surface Mining on 25 Migratory Bird Species of High Federal Interest, J.S. Armbruster, (editor), pages 185-196. Department of the Interior, U.S. Fish and Wildlife Service, FWS/OBS-83/85. 348 pp.

_____. 2003. Mountain plover (*Charadrius montanus*): A technical conservation assessment. USDA Forest Service, Rocky Mountain Region. <http://www.fs.fed.us/r2/projects/scp/assessments/mountainplover.pdf>. Accessed August 20, 2009.

Dooling, R. 2002. Avian hearing and the avoidance of wind turbines. National Renewable Energy Laboratory. NREL/TP-500-30844.

Erickson, W.P. 2004. Bird fatality and risk at new generation wind projects. In Proceedings of the wind energy birds/bats workshop: Understanding and resolving bird and bat impacts, Washington, D.C., May 18-19, 2004 (S.S. Schwartz, ed.). Prepared by RESOLVE, Inc., Washington, D.C. 107 pp. + append.

Erickson, W., K. Kronner, and B. Gritski. 2003. Nine Canyon wind power project, avian and bat monitoring report, September 2002-August 2003. Technical report prepared for Nine Canyon Technical Advisory Committee and Energy Northwest.

_____. 2009. Wildlife impacts panel presented at BLM renewable energy summit, Las Vegas, Nevada, September 2, 2009. Erickson is with Western EcoSystems Technology, Cheyenne, Wyoming.

Erickson, W.P., G.D. Johnson, D.P. Young, Jr., M.D. Strickland, R.E. Good, M. Bourassa, K. Bay, and K.J. Sernka. 2002. Synthesis and comparison of baseline avian and bat use, raptor nesting and mortality information from proposed and existing wind developments. Prepared by West, Inc. for Bonneville Power Administration.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, Jr., K.J. Sernka, and R.E. Good. 2001. Avian collisions with wind turbines: A summary of existing studies and comparisons to other sources of avian collision mortality in the United States. National Wind Coordinating Committee Publication. <http://www.nationalwind.org/publications/wildlife/avian_collisions.pdf>. Accessed August 20, 2009.

Erlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook: A field guide to the natural history of North American birds. Simon and Schuster Inc., New York, New York. 785 pp.

Federal Aviation Administration. 2007. Obstruction marking and lighting. U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 70/7460-1K. Washington, D.C. 35 pp. + append.

Fenneman, Nevin M. 1931. Physiography of the western United States. McGraw-Hill Book Company, New York.

Fielding, C.R., H.E. LaGarry, L.A. LaGarry, B.E. Bailey, and J.B. Swinehart. 2007. Sedimentology of the Whiteclay Gravel Beds (Ogallala Group) in northwestern Nebraska, USA: Structurally controlled drainage promoted by Early Miocene uplift of the Black Hills Dome. Sedimentary Geology v. 202: pp. 58-71.

Fiorillo, A.R. 1988. Taphonomy of Hazard Homestead Quarry (Ogallala Group), Hitchcock County, Nebraska: Contributions to geology. The University of Wyoming, v. 26, pp. 57-97.

Flanagan, K.M., and J. Montagne. 1993. Neogene stratigraphy and tectonics of Wyoming. In A.W. Snoke, J.R. Steidtmann, and S.M. Roberts, eds., Geology of Wyoming: Geological Survey of Wyoming, Memoir No. 5, pp. 572-607.

Gehring, J., P. Kerlinger, and A.M. Manville, II. 2009. Communication towers, lights, and birds: Successful methods of reducing the frequency of avian collision. Journal of Ecological Applications, March 2009.

General Electric. 2004. Technical documentation wind turbine generator system GE 1.5sl/sle 50 & 60 hz. <www.gewindenergy.com>. Accessed March 17, 2009.

General Accounting Office. 2005. Wind power: Impacts on wildlife and government responsibilities for regulating development and protecting wildlife. GAO-05-906. September.

Graul, W.D., and L.E. Webster. 1976. Breeding status of the mountain plover. Condor 78:265-267.

Gruver, J.C. 2002. Assessment of bat community structure and roosting habitat preferences for the hoary bat (*Lasiurus cinereus*) near Foote Creek Rim, Wyoming. M.S. thesis, University of Wyoming, Laramie, Wyoming.

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. Bats of the United States. Arkansas Game & Fish Commission and U.S. Fish and Wildlife Service, Arkansas.

Irby, L.R., R.J. Mackie, H.I. Pac, and W.F. Kasworm. 1988. Management of mule deer in relation to oil and gas development in Montana's overthrust belt. Pages 113-121 *In* J. Emerick, S.Q. Foster, L. Hayden-Wing, J. Hodgson, J.W. Monarch, A. Smith, O. Thorne, II, and J. Todd (eds), Proceedings III: Issues and technology in the management of impacted wildlife. Thorne Ecological Institute, Boulder, Colorado. 177 pp.

Jain, A. 2005. Bird and bat behavior and mortality at a Northern Iowa windfarm. M.S. thesis, Iowa State University, Aimes.

Johnsgard, Paul A. 2004. The Birds of Nebraska: Self published.

Johnson, G.D. 2004. A review of bat impacts at wind farms in the U.S. Proceedings of the wind energy and birds/bats workshop: Understanding and resolving bird and bat impacts, S.S. Schwartz, ed. Washington, D.C. May 18-19, 2004.

_____. 2005. A review of bat mortality at wind-energy developments in the United States. Bat Research News 46(2).

Johnson, G.D., D.P. Young, W.P. Erickson, C.E. Derby, M.D. Strickland, R.E. Good. 2000. Final report, wildlife monitoring studies, SeaWest Windpower Project, Carbon County, Wyoming. 1995-1999. Prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyoming. 195 pp.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, S.A. Sarappo. 2003. Mortality of bats at a large-scale wind power development at Buffalo Ridge, Minnesota. The American Midland Naturalist 150(2). October.

Keith, D.W., J.F. DeCarolis, D.C. Denkenberger, D.H. Lenschow, S.L. Malyshev, S. Pacala, and P.J. Rasch. 2004. The influence of large-scale wind power on global climate. Publications of the National Academy of Sciences 101(46):16115-16120.

Kimball County. 2010. Kimball County zoning and subdivision regulations. Adopted October 5, 2010. <http://www.co.kimball.ne.us/content/zoning%20regulation>. Accessed July 12, 2011.

Kimball Visitor Information. 2011. <http://www.ci.kimball.ne.us/visitor_info.htm>. Accessed August 9, 2011.

Knopf, F.L. 1996. Mountain plover. Birds of America, No. 211.

Knopf, F.L., and M.B. Wunder. 2006. Mountain plover. The Birds of America, No. 211. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and the American Ornithologists Union, Washington, D.C.

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological impacts of wind energy development on bats: Questions, research, needs, and hypotheses. Front Ecol Environ 5(6).

Leddy, K.L., K.F. Higgins, and D.E. Naugle. 1999. Effects of wind turbines on upland nesting birds in conservation reserve program grasslands. Wilson Bulletin 111 (1):100-104.

Leite, M.B. 1990. Stratigraphy and mammalian paleontology of the Ash Hollow Formation (upper Miocene) on the north shore of Lake McConaughy, Keith County, Nebraska. Contributions to Geology, The University of Wyoming, v. 28, p. 1-29.

Lugn, A.L. 1939. Classification of the Tertiary System in Nebraska. Geological Society of America Bulletin, v. 50, pp. 1245-1276.

Maher, H.D., Jr., G.F. Engelmann, and R.D. Shuster. 2003. Roadside geology of Nebraska. Mountain Press Publishing Company, Missoula, Montana.

McKenna, M.C., and S.K. Bell. 1997. Classification of mammals above the species level. New York, Columbia University Press. 631 pp.

Miller, J.C. 1991. Lithic resources. In Prehistoric Hunters of the High Plains, edited by George C. Frison, pp. 449-476. Second Edition. Academic Press, New York.

Mujadi, E., and C.P. Butterfield. 2000. Pitch-controlled variable-speed wind turbine generation. NREL/CP-500-27143. National Renewable Energy Laboratory, Golden, Colorado. 10 pp.

National Energy Policy Development Group. 2001. National energy policy: Reliable, affordable, and environmentally sound energy for America's future. Prepared by National Energy Policy Development Group for the President of the United States of America.

National Renewable Energy Laboratory. 2011. <http://www.eere.energy.gov/windpowering america/images/windmaps/co_50m_800.jpg>. Accessed on August 8, 2011.

National Research Council. 2007. Environmental impacts of wind energy projects. Board on Environmental Studies and Toxicology, Division on Earth and Life Sciences. National Academies Press, Washington, D.C. 376 pp.

National Wind Coordinating Committee. 2001. Avian collisions with wind turbines: A summary of existing studies and comparisons to other sources of avian mortality in the United States.

Nebraska Game and Parks Commission. 2011. Guidelines for wind energy and wildlife resource management in Nebraska. The Nebraska Wind and Wildlife Working Group. February 8, 2011. <http://outdoornebraska.ne.gov/wildlife/windwildlife.asp>. Accessed February 20, 2011.

_____. 2011b. Wildlife Species Guide. Black-footed-Ferret. A Threatened and Endangered Species. <http://outdoornebraska.ne.gov/wildlife/wildlife.species_guide/ferret.asp>. Accessed September 6, 2011. 7 pp.

Reed, D.F. 1981. Conflicts with civilization. Pages 509-535 In O.C. Wallmo (ed.), mule deer and black-tailed deer of North America. Wildlife Management Institute, University of Nebraska Press, Lincoln. 605 pp.

Rocky Mountain Bird Observatory. 2011a. Colorado Butterfly Plant in Nebraska. <http://rmbo.org/v2/web/science/research/butterfly.asp>.

_____. 2011b. Migration chronology, nesting ecology, and breeding distribution of mountain plover (*Charadrius montanus*) in Nebraska. <http://www.rmbo.org/v2/web/sceince/ research/noup_ne.aspx>. Accessed July 13, 2011.

Rogers, A.L., J.F. Manwell, and S. Wright. 2006. Wind turbine acoustic noise. Renewable Energy Research Laboratory, Amherst, Massachusetts. 26 pp.

Sawyer, H., R. Nielson, and D. Strickland. 2009. Sublette mule deer study (Phase II): Final report 2007, long-term monitoring plan to assess potential impacts of energy development on mule deer in the Pinedale Anticline Project Area, 2001-2007. Western Ecosystems Technology, Inc. Cheyenne, Wyoming. 127 pp.

Sightline Institute. 2011. Gray wolf: Current Historic Range Map. <http://sightline.org/maps/maps/wildlife-wolf.

Strickland D. 2009. Current sage grouse research. Presentation at Wyoming Wind Symposium, Laramie, Wyoming, August 13-14, 2009. 13 pp. <http://www.uwyo.edu/enrsupport/Conferences/windsymposium/Dale_Strickland_Current_SageGrouse_Research.pdf>. Accessed August 31, 2009.

Tedford, R.H., L.B. Albirth, A.D. Barnosky, I. Ferrusquiz-Villafranca, R.M. Hunt, J.E. Storer, C.C. Swisher, M.R. Voorhies, D.S. Webb, and D.P. Whistler. 2004. Mammalian biochronology of the Arikareean through Hemphillian interval (Late Oligocene through early Pliocene Epochs). In M.O. Woodburne, ed., Late Cretaceous and Cenozoic Mammals of North America: Biostratigraphy and Geochronology. Berkeley, University of California Press. pp. 169-231.

Tedford, R.H., M.F. Skinner, R.W. Fields, J.M. Rensberger, D.P. Whistler, T. Galusha, B.E. Taylor, J.R. Macdonald, and S.D. Webb. 1987. Faunal succession and biochronology of the Arikareean though Hemphillian interval (Late Oligocene through earliest Pliocene Epochs) in North America. In M.O. Woodburne, ed., Cenozoic Mammals of North America: Geochronology and Biostratigraphy. Berkeley, University of California Press, pp. 153-210.

TetraTech EC, Inc. 2008. Raptor nest survey and habitat evaluation for listed wildlife and plant species, Kimball Wind Resource Area, Kimball County, Nebraska. Prepared for Generation Energy, Inc. July 18, 2008. 20 pp.

Topper, R., K.L. Spray, W.H. Bellis, J.L. Hamilton, and P.E. Barkmann. 2003. Ground water atlas of Colorado. Colorado Geological Survey Special Publication 53. Division of Minerals and Geology, Department of Natural Resources, Denver, Colorado. 210 pp.

TRC Environmental Corporation. 2008. Post Construction Avian and Bat Fatalities Monitoring at the Spring Canyon wind project, Logan County, Colorado. Prepared for Spring Canyon Energy, LLC, Chicago, Illinois. Prepared by TRC Environmental Corporation, Laramie, Wyoming. January 2008. 29 pp. + append.

_____. 2009a. Results of wetlands and other waters of the U.S. survey, South Table Wind Energy Farm, Kimball County, Nebraska. Prepared for Generation Energy, Inc., Sterling, Virginia. Prepared by TRC Environmental Corporation, Laramie, Wyoming. June 2009. 12 pp. + appendices.

_____. 2009b. 2009 spring raptor nest survey results, South Table Wind Farm, Kimball County, Nebraska. Letter report prepared for South Table Wind I, LLC, Sterling, Virginia. Prepared by TRC Environmental Corporation, Laramie, Wyoming, July 16, 2009. 3 pp. + appendices.

_____. 2009c. Results of the 2008 grassland bird displacement study at the Judith Gap Wind Project, Wheatland County, Montana. Prepared for Judith Gap Energy, LLC, Chicago, Illinois. 26 pp. + append.

_____. 2010a. Bat acoustic survey for the South Table Wind Energy Project, Kimball County, Nebraska. Prepared for South Table Wind I, LLC, Sterling, Virginia, and Western Area Power Administration, Loveland, Colorado. Prepared by TRC Environmental Corporation, Laramie, Wyoming. April 2010. 18 pp. + appendix.

_____. 2010b. Avian fall and spring migration monitoring studies, South Table Wind Energy Project, Kimball County, Nebraska. Prepared for South Table Wind I, LLC, Sterling, Virginia, and Western Area Power Administration, Loveland, Colorado. Prepared by TRC Environmental Corporation, Laramie, Wyoming. April 2010. 34 pp. + appendix.

_____. 2010c. A Class III Cultural Resource Inventory of the South Table Wind Farm, Kimball County, Nebraska. Prepared for South Table Wind I, LLC, Sterling, Virginia, and Western Area Power Administration, Loveland, Colorado. Prepared by TRC Environmental Corporation, Laramie, Wyoming. December 2010. Revised December 2011. 71 pp. + appendices.

_____. 2011a. 2011 spring raptor nest survey results, South Table Wind Farm, Kimball County, Nebraska. Letter report prepared for South Table Wind I, LLC, Sterling, Virginia. Prepared by TRC Environmental Corporation, Laramie, Wyoming, June 27, 2011. 3 pp. + appendices.

_____. 2011b. Golden eagle observation, South Table Wind Energy Project, Kimball County, Nebraska. Letter report prepared for South Table Wind I, LLC, Sterling, Virginia. Prepared by TRC Environmental Corporation, Laramie, Wyoming. July 19, 2011. 4 pp. + attachments.

_____. 2011c. Ten-mile golden eagle nest inventory, South Table Wind Farm Project, Kimball County, Nebraska. Letter report prepared for South Table Wind I, LLC, Sterling, Virginia. Prepared by TRC Environmental Corporation, Laramie, Wyoming. June 27, 2011. 5 pp. + map attachment.

_____. 2011d. Golden eagle use and flight pattern studies, South Table Wind Farm project, Kimball County, Nebraska. Prepared by TRC Environmental Corporation, Laramie, Wyoming. December 2011. 19 pp. + append.

_____. 2012a. 2011 Bat acoustic survey for the South Table Wind Farm project, Kimball County, Nebraska. Prepared for South Table Wind I, LLC, Sterling, Virginia, and Western Area Power Administration, Loveland, Colorado. Prepared by TRC Environmental Corporation, Laramie, Wyoming. January 2012.

_____. 2012b. 2011 Avian spring and fall migration monitoring studies, South Table Wind Energy Project, Kimball County, Nebraska. Prepared for South Table Wind I, LLC, Sterling, Virginia, and Western Area Power Administration, Loveland, Colorado. Prepared by TRC Environmental Corporation, Laramie, Wyoming. 48 pp. + append.

U.S. Census Bureau. 2011. American factfinder. <http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=ChangeGeoContext&geo_id=16000US3125475&_geoContext=&_street=&_county=kimball&_cityTown=kimball&_state=04000US31&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=010&_submenuId=factsheet_1&ds_name=ACS_2009_5YR_SAFF&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=>. Accessed August 16, 2011.

U.S. Department of Agriculture. 2005. Soil survey of Kimball County, Nebraska. Government Printing Office, Washington D.C.

_____. 2011. Soilmart data for Kimball County. <soildatamart.nrcs.gov>. Accessed August 11, 2011.

U.S. Department of Energy. 2004. Recommendation for the preparation of environmental assessments and environmental impacts statements, second edition. <http://nepa.energy.gov/nepa_documents/TOOLS/GUIDANCE/Volume2/2-10-greenbook-recommendations.pdf>. Accessed July 29, 2011.

U.S. Environmental Protection Agency. 1992. Storm water management for construction activities, developing pollution prevention plans and best management practices. EPA 832-R-92-005. Government Printing Office, Washington, D.C. 190 pp. + append.

_____. 2007. Interim developing your stormwater pollution prevention plan: A guide for construction sites. EPA 833-R-060-04, Government Printing Office, Washington, D.C. 46 pp.

U.S. Fish and Wildlife Service. 2002. Migratory bird mortality, many human-caused threats afflict our bird populations. January. <http://www. fws.gov/birds/mortality-fact-sheet.pdf>. Accessed March 2008.

_____. 2001a. Endangered, threatened, proposed, and candidate species in Nebraska counties. January 2011. <http://www.fws.gov/Nebraskaes>. Accessed September 12, 2011.

_____. 2011b. Gray wolf (Canis lupus). Current population in the United States. Updated November 21, 2011. <http://www.fws.gov/midwest/wolf/aboutwolves/wolfpopUS.htm>. Accessed December 1, 2011.

_____. 2011c. Mountain plover. <http://www.fws.gov/mountain-prairie/species/birds/mountainplover/>. Accessed August 9, 2011.

U.S. Geological Service. 2011. Groundwater atlas of the United States. Kansas, Missouri, and Nebraska. HA 730-D. <http://pubs.usgs.gov/ha/ha730/ch_d/D-text2.html>. Accessed August 17, 2011.

Ver Ploeg, A.J., and C.S. Boyd. 1999. Preliminary digital geologic map of the Laramie 30’ x 60’ quadrangle, Albany and Laramie counties, southeastern Wyoming.

Vorrhies, M.R. 1969. Taphonomy and population dynamics of an Early Pliocene vertebrate fauna, Knox County, Nebraska: Contributions to Geology, The University of Wyoming, Special Paper 1, 69 pp.

Walter, W.D., D.M. Leslie, Jr., and J.A. Jenks. 2004. Response of Rocky Mountain elk (*Cervus elaphus*) to wind-power development in southwestern Oklahoma. Wildlife Society Abstracts, 2004 Wildlife Society Annual meeting, Calgary, Alberta, Canada.

Western Area Power Administration. 2005. Pre-approval environmental assessment Spring Canyon Wind project, Logan County, Colorado formerly known as Peetz Table Wind Project. DOE/EA-1521. Prepared by the U.S. Department of Energy Western Area Power Administration, Rocky Mountain Region Loveland, Colorado. May 2005. 130 pp. + appendices.

_____. 2011. System impact study, 2010-G4, 2011-T2. March 2011. Rocky Mountain Region. 33 pp. + figures.

Western Ecosystems, Inc. 2008. Results swift fox (*Vulpes velox*) surveys in Kimball County, Nebraska. Prepared for Generation Energy, Inc., Sterling, Virginia. Prepared by Western Ecosystems, Inc., Cheyenne, Wyoming, November 20, 2008. 6 pp. + tables.

_____. 2009. Mountain plover surveys at the South Table Wind Resource Area, Kimball County, Nebraska. Spring 2009. Prepared for Generation Energy, Inc., Sterling, Virginia. Prepared by Western Ecosystems, Inc., Cheyenne, Wyoming. June 22, 2009. 8 pp.

Western Regional Climate Center. 2011. Appendix F-L: Regional Emission Calculation Worksheets. <http://www.wrcc.dri.edu/cgi-bin/cliRECtm.pl?coster>. Accessed on August 4, 2011.

Young, D.P., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2004. Final report: Avian and bat mortality associated with the initial phase of the Foote Creek Rim Windpower project, Carbon County, Wyoming. January 10.

APPENDIX A:

EA DETERMINATION NOTICE AND
OPEN HOUSE LETTER

Environmental Assessment Determination
For A Proposal to Approve an Interconnection Application
For the South Table Wind Project, Kimball County, NE

Project: Generation Energy, Inc. (Generation Energy) interconnection request, South Table Wind Project, Kimball County, NE.

Western Area Power Administration (Western) determined that an environmental assessment (EA) would be prepared for its proposal to approve an application for interconnection submitted by Generation Energy, Inc. (Generation Energy) for 60 megawatts (MW) of wind generation on Western's existing Archer-Sidney 115-kV Transmission Line. Generation Energy's proposed project would include the installation and operation of approximately ___ wind turbines with a total combined nameplate capacity of 60 megawatts (MW). The output of the wind project on an average annual basis would be less than 50 MW. The project includes related facilities such as substations, switchyards, installation of equipment, construction of a transmission line from the proposed project to the point of interconnection with Western, access roads and other actions that will be described in the EA.

Western's proposal to approve the interconnection application falls under a Class of Actions that normally require the preparation of environmental assessment. The specific class of action is described in Appendix C to Subpart D to Part 1021 – "Classes of Actions that Normally require EAs but not necessarily EISs" (DOE NEPA Implementing Procedures, 10 CFR 1021, Subpt. D, App.C). Class of action C7 states: "Establishment and implementation of contracts, policies, marketing plans, or allocation plans for the allocation of electric power that do not involve (1) the addition of new generation resources greater than 50 average megawatts, (2) major changes in the operating limits of generation resources greater than 50 average megawatts, or (3) service to discrete new loads of 10 average megawatts or more over a 12 month period. This applies to power marketing operations and to siting, construction, and operation of power generation facilities at DOE sites".

Western accepts applications from electric utilities, firm-power customers, private power developers, and independent power generators to interconnect with its transmission system. More information on the interconnection process and requirements can be found in: *Western Area Power Administration. September 1999. General Requirements for Interconnection.* Western evaluates each application for interconnection and must meet reasonable needs of the applicant. Western typically assumes responsibility for operateing and maintaining interconnected transmission-related facilities. Western's proposed action is to approve the interconnection request and to construct own and operate a substation and related faciliites at the point of interconnection. Western would consider the environmental impacts associated with the interconnected project in its decision on the interconnection request. The EA will evaluate the environmental impacts associated with the applicant's proposed action of constructing, operating, and maintaining the wind project and impacts associated with transmission system modifications Western may need to accomplish for interconnecting the project.

Approved: _____ Date: _____

Bradley S. Warren

Regional Manager

BC:

Yardena Mansoor, GC-54, Department of Energy, Forrestal Bldg, Washington, DC
Shane Collins, A7400, Lakewood, CO
Matt Blevins, A7400, Lakewood, CO
J4230, D. Farm
J5600, T. Trujillo
J0400

Mailed out on June 2, 2011

Western
AREA POWER
ADMINISTRATION

Notification of Public Open House Meeting
for the
Proposed South Table Wind Farm Project
Kimball County, NE

Western Area Power Administration (Western), a power marketing agency within the U.S. Department of Energy, is preparing to evaluate a request for interconnection of a proposed 60-megawatt (MW) wind power generation project in Kimball County, Nebraska. Western and South Table Wind, LLC (STW) will be holding a public open house meeting to share information and solicit comments regarding cultural and environmental resources associated with the proposed project that may be of interest or importance to you.

The South Table Wind Farm Project informational open house meeting will be held at the following time and location:

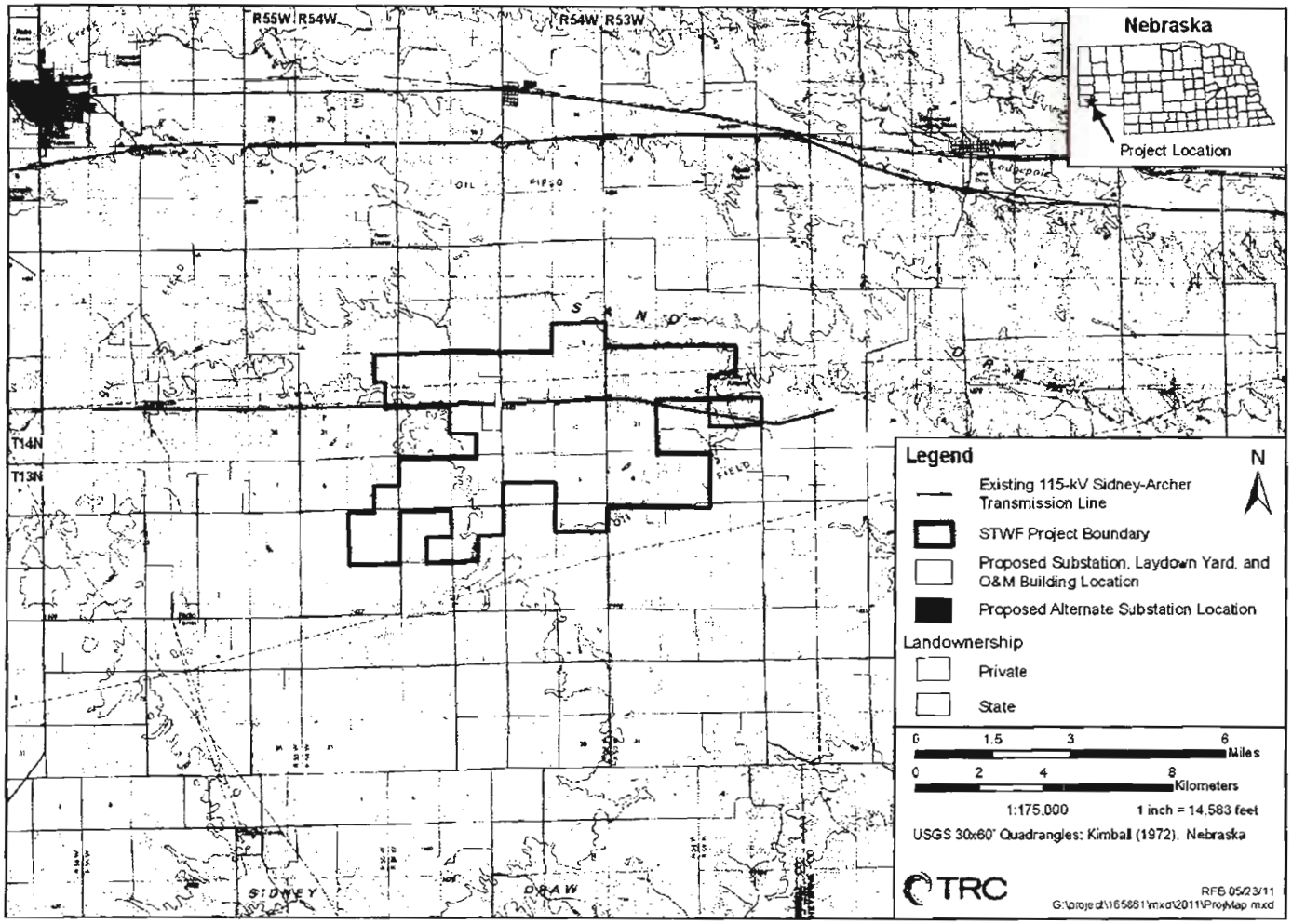
June 14, 2011
3:00-7:00 p.m.
Kimball Event Center
615 East 3rd Street
Kimball, Nebraska

STW submitted an interconnection request to Western seeking to interconnect the proposed South Table Wind Farm Project (Project) to Western's existing Sidney-Archer 115-kV transmission line. The Project is located in the panhandle of southwestern Nebraska in Kimball County, and is approximately four miles south of the Village of Dix and Interstate-80. The overall project study area encompasses 28,500 acres, or approximately 44.5 square miles (see back for map).

If approved, the Project would consist of forty 1.5 MW or twenty four 2.5 MW (or a combination thereof) electric wind power generation turbines, with the final site plan expected to be distributed over approximately 12 sections within the project study area.

Western is the lead Federal agency for the preparation of the environmental assessment (EA) for this project. TRC Environmental Corporation (TRC), an environmental contractor based in Laramie, Wyoming, has conducted baseline studies and will evaluate the natural, human, and cultural resources that could potentially be affected by the proposed project. Specifically, TRC has collected baseline biological data and conducted Class I and III cultural resource inventories. The results of these studies, inventories, and evaluations will assist in planning for the construction of the proposed project. TRC will prepare the EA for Western's review. The Pre-Approval EA will be released to the public for a 30 day comment period prior to final approval by Western.

SOUTH TABLE WIND FARM PROJECT



Generation ENERGY

Western Area Power Administration

APPENDIX B:

U.S. ARMY CORPS OF ENGINEERS
JURISDICTIONAL DETERMINATION LETTER

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NEBRASKA REGULATORY OFFICE – KEARNEY
2214 2ND AVENUE
KEARNEY, NEBRASKA 68847

REPLY TO
ATTENTION OF

https://www.nwo.usace.army.mil/html/od-rne/nehome.html

MFR # 145861.2.

October 26, 2009

Mr. Danny McCrystal
South Table Wind I, LLC
22375 Broderick Drive, Suite 110
Sterling, Virginia 20166

RE: 2009-01305-KEA

Dear Mr. McCrystal:

We have reviewed the July 14, 2009 request for a preliminary jurisdictional determination, submitted on your behalf by TRC Environmental Corporation, for the proposed South Wind Table Wind Farm. The project is located in Section 23, Township 12 North, Range 55 West, Kimball County, Nebraska.

Based on the information provided, we have determined that there are no jurisdictional waters of the United States located within the identified project boundaries. Therefore, the activity is not subject to Department of the Army (DA) regulatory authorities and no permit pursuant to Section 404 is required from the U.S. Army Corps of Engineers.

A preliminary jurisdictional determination (JD) has been completed for your project. If, in the future, you plan to place fill material in any waters of the United States please provide this office with an application for review for possible permit requirements.

The Omaha District, Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, please take a moment to complete our Customer Service Survey found on our website at http://per2.nwp.usace.army.mil/survey.html. If you do not have Internet access, you may call and request a paper copy of the survey that you can complete and return to us by mail or fax.

If you have any question regarding this determination, please contact Keith Tillotson at the above address or call (308)234-1403 and refer to file number **2009-01305-KEA**.

Sincerely,

John L. Moeschen
Nebraska State Program Manager

Copy Furnished:

TRC Environmental Corp. (Hart)

APPENDIX C:

GOLDEN EAGLE USE AND
FLIGHT PATTERN STUDIES

GOLDEN EAGLE USE AND FLIGHT PATTERN STUDIES, SOUTH TABLE WIND FARM PROJECT, KIMBALL COUNTY, NEBRASKA

Prepared for

South Table Wind, LLC
Sterling, Virginia

and

Western Area Power Administration
Loveland, Colorado

Prepared by

TRC Environmental Corporation
Laramie, Wyoming

December 2011

GOLDEN EAGLE USE AND FLIGHT PATTERN STUDIES, SOUTH TABLE WIND FARM PROJECT, KIMBALL COUNTY, NEBRASKA

Prepared for

South Table Wind, LLC
Sterling, Virginia

and

Western Area Power Administration
Loveland, Colorado

By

TRC Environmental Corporation
Laramie, Wyoming
TRC Project 165861

December 2011

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

Generation Energy, Inc. (GEI) has submitted an interconnection request to the Western Area Power Administration (Western) for a connection of its proposed South Table Wind Farm (STWF) Project to Western's existing Sidney-Archer 115-kilovolt (kV) transmission line. Under a joint venture agreement, GEI and Bechtel Development Company have formed South Table Wind, LLC (STW), and STW will be the developer, contractor, and operator of the STWF Project. The project is located in the panhandle of southwestern Nebraska in Kimball County approximately 4 mi south of Interstate 80 (I-80) and approximately 6 mi southeast of Kimball, Nebraska, in Kimball County. The STWF Project would consist of a maximum of 40 1.5-megawatt (MW) or 24 2.5-MW (or a similar combination thereof) wind electric power generation turbines sited within an approximately 11,287-acre project area (Figure 1.1).

An environmental assessment (EA) was prepared for the project by TRC Environmental Corporation (TRC), Laramie, Wyoming, for compliance with the *National Environmental Policy Act* (NEPA). The EA is currently under review by Western. As part of the NEPA process and EA preparation, Western has required specific preconstruction studies/surveys be completed as part of their environmental review process in order to assess impacts of the project on select resources (Western 2007). TRC was contracted by STW to conduct a survey for migratory birds in 2009. The results of the 2009 surveys are provided in TRC (2010). A second year of avian studies were required by Western with special attention paid to determining use of the STWF project area by golden eagles. A report was prepared with the results of a second year of preconstruction avian studies conducted in 2011 and also provides a discussion of a comparison of 2 years of preconstruction avian studies conducted in 2009 and 2011. The results are presented in TRC (2011a).

This report focuses on the golden eagle use and flight patterns studies conducted in 2011 during 22 weekly surveys within and in the vicinity of the STWF project area. These studies were developed and implemented following the release of the U.S. Fish and Wildlife Services's (USFWS's) Draft Golden Eagle Conservation Plan (2011a) and Draft Land-Based Wind Energy Guidelines (2011b) in early 2011. The purposes of these studies were to provide an assessment

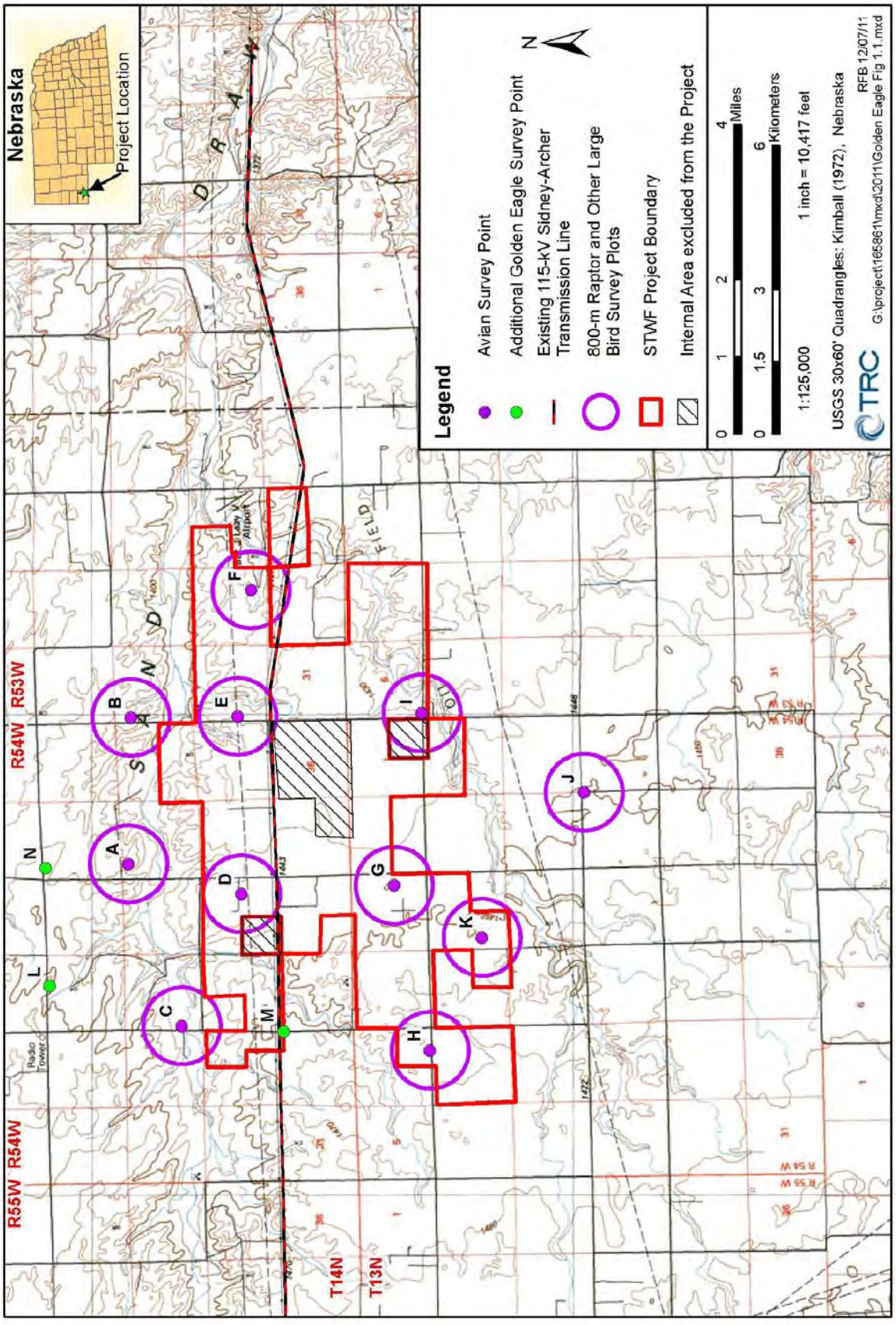


Figure 1.1 Location of the Proposed South Table Wind Farm Project and Avian Survey Plots, Kimball County, Nebraska.

of spatial and temporal golden eagle use of the project area, to provide quantitative data that are useful for providing an estimate of impacts and risk, and to aid in the design phase of the project to avoid or minimize risk to golden eagles.

The studies and methodologies were designed based on discussions with Western, the USFWS Nebraska Ecological Service Office, and Nebraska Game and Parks (NG&P) in early 2011. This assessment is based on golden eagle observational data collected during the 2011 avian use studies and raptor nest inventories (TRC 2011a, 2011b, and 2011c) and also incorporates observational data from the 2009 avian use surveys (TRC 2009, 2010). Documentation of more-detailed eagle use of the project area was in part due to GEI's desire for due diligence in response to the release of the February 2011 Draft Eagle Conservation Plan Guidance document (USFWS 2011a).

2.0 METHODS

2.1 2009 AVIAN SURVEYS

The 2009 results are based on golden eagle observations gathered during the 12-week spring avian studies (March 16 through June 5, 2009), the 10-week fall survey (August 20 through October 27, 2009) (TRC 2010), and the spring raptor nest survey (TRC 2009). Golden eagle observations were gathered during the raptor and other large bird surveys (RLB) within 11 0.5-mi radius survey plots (refer to Figure 1.1) and during incidental observations of golden eagle within the project area during the weekly spring and fall avian surveys and other field surveys (raptor nest surveys). Specific survey methodologies are provided in the 2009 and 2010 reports. Flight path data for golden eagles outside the 11 established survey plots were not collected in 2009 as this was not a method included in the study plan. However, incidental golden eagle observation data were recorded.

2.2 2011 GOLDEN EAGLE USE AND FLIGHT PATTERN SURVEYS

In 2011, the golden eagle observations were recorded during the 20 weekly site visits for the spring avian studies (April 12-June 21, 2011) and fall avian studies (August 19-October 19, 2011), the 1.0-mi raptor nest surveys conducted May-June (TRC 2011c), and the June 10.0-mi golden eagle nest inventory (TRC 2011b). The avian surveys were conducted weekly at the 11 survey plots established in 2009 (refer to Figure 1.1). Each survey was conducted for two consecutive days with passerine surveys initiated at sunrise and continued until 3 hours after sunrise, followed by the RLB surveys. Additional time was spent following the avian surveys searching the project area and vicinity for golden eagles. Three additional golden eagle 1-hour survey points, Plots L, M, and N (refer to Appendices A and B), were established in April 2011 north of the project area when golden eagles were noted flying north and outside of the established RLB survey plots. As a result, a biologist was in the project area and vicinity observing raptor use between 14 to 16 hours each week for 20 weeks (a total of approximately 300 hours). All golden eagle observed en route to established survey plots or outside the project area, along with flight direction and height, were recorded on incidental observation data sheets

throughout the 2011 avian surveys. Flight heights were estimated and classified by flight height categories A, B, or C to coincide with the rotor-swept area (RSA) of a 1.5-MW wind turbine. Flight height category A is from ground level to 35 m, which is below the RSA; Flight height category B is 36-135 m, which is within the RSA; and Flight height category C is >135 m, which is above the RSA.

All eagle observations, including flight pattern, were mapped in the field on 1:24,000-scale U.S. Geological Survey topographic maps with particular attention paid to spatial use of the landscape and time duration, as well as direction and height of flight. The 2011 observations and flight patterns are provided in Appendix A.

Golden eagle use areas were defined based on the compilation of all golden eagle observations recorded during the 2011 field visits. A 200 x 200-m grid was overlaid on the entire project area and vicinity to map golden eagle observations. A 200-m grid was chosen because this was the grid used for the RLB weekly studies. The golden eagle use areas were compiled and separated by the number of observations (i.e., one, two, three, etc., observations) in a particular 200-m grid area. The golden eagle use data are provided in Appendix B. The purpose of this data was to identify high use eagle areas within the project area and vicinity.

2.3 2011 GOLDEN EAGLE 10-MI RADIUS NEST INVENTORY

This task was implemented based on discussions with Western, USFWS Nebraska Ecological Service Office, and NG&P during a May 26, 2011, conference call. The draft golden eagle guidance document (USFWS 2011b) recommends a 10-mi buffer be inventoried for nests around the proposed wind farm boundaries. While the guidance document recommends aerial surveys be conducted, TRC and Western developed an alternative approach to inventory: using a ground-based method inventory for the 10-mi radius area. This method was approved by USFWS and NG&P in an email dated May 27, 2011, from Misti Shriner, Western.

Prior to conducting the ground-based nest inventory, TRC used satellite imagery and aerial photos to identify possible nesting substrate or suitable nesting habitat such as cliffs or treed

areas from among the 357,785 acres (approximately 559 mi^2) present in the proposed project and 10-mi buffer. Using these narrowed habitat locations, TRC biologists drove all county and public roads to ground truth the classification of suitability polygons and to locate any golden eagle nests within the 10-mi radius survey area. All potential nesting areas (e.g., trees and cliffs) and areas where sign (i.e., whitewash, nests, sticks) or territorial behavior was observed were scanned using binoculars or a spotting scope for the presence of eagle nests. A global positioning system unit was used to record the locations of any golden eagle nests and observations. Photographs were taken of each nest, and golden eagle activity and observations were noted. In addition, TRC recorded the locations of any prairie dog colonies that were observed during the inventory for golden eagle nests, because they are a common prey for golden eagles (Cornell Lab of Ornithology 2011, Olendorff 1976, Sibley 2003).

3.0 RESULTS

3.1 2009 GOLDEN EAGLE USE

Golden eagle flight patterns and observations for 2009 are presented on Figure 3.1 and in Table 3.1.

A total of 19 golden eagle observations was recorded during the 2009 avian use surveys. Seventeen golden eagle observations were recorded during the spring 2009 surveys, and two were observed during the fall 2009 avian surveys. Fifteen of the golden eagle observations were a result of incidental observation (i.e., not recorded as part of the systematic sampling of the project). Most (88%) of the spring observations were associated with the golden eagle nest located adjacent to the STWF project area in Section 22, T14N, and R54W. The one observation in Section 2, T13N, R54W, on April 10, 2009, was a perched golden eagle noted during a RLB survey that then flew south and out of the project area. One golden eagle was recorded perched on a power pole during the fall 2009 RLB avian surveys on September 24, 2009, in Section 32, T14N, R53W (Figure 3.1).

The first site visit in 2009 was on March 12, and the avian surveys were initiated March 19, 2009. One eagle was observed incubating during site visits on March 12, 19, and 25, April 2, 10, 14, 21, and 29, and May 6, 14, and 19. One adult was seen on the nest, and a second adult was observed perched in the nest cliff or on a power pole located within 500 ft of the nest. The nest produced two eaglets and was monitored until the end of the 2009 spring avian studies. This golden eagle nest (see TRC 2009 and 2011c) was first located during the presiting surveys conducted in 2008 (Tetra Tech 2008) and was monitored during weekly avian use studies in 2009 (TRC 2009). The golden eagle nest was observed as active in 2008, 2009, and 2011 (Tetra Tech 2008; TRC 2009, 2011c). The nest was not surveyed in 2010.

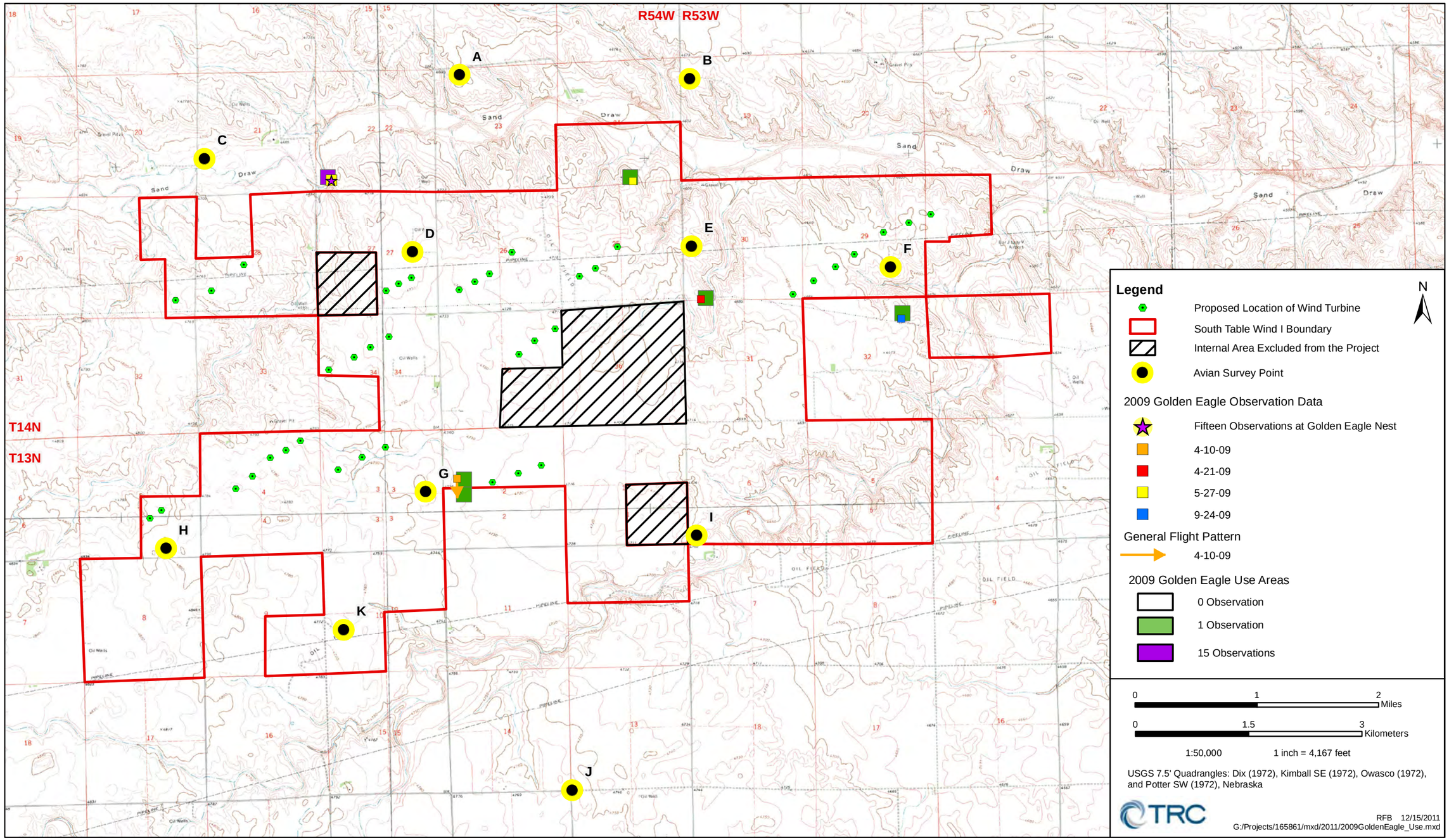


Figure 3.1 2009 Golden Eagle Observations and Use Areas.

Table 3.1 2009 Golden Eagle Observations, STWF Project.

Date	Observer	Type of Survey[1]	Location				Number of Eagles	Age[2]	Activity[3]	Flight Height[4]
			QQ	SEC	T	R				
3/19/2009	R. Johnson	I	SWSW	22	14N	54W	2		NE/PE	n/a
3/25/2009	R. Johnson	I	SWSW	22	14N	54W	1		NE/PE	n/a
4/2/2009	R. Johnson	I	SWSW	22	14N	54W	2		NE/PE	n/a
4/10/2009	R. Johnson	RLB	SWNW	2	13N	54W	1		PE/FL	A
4/10/2009	R. Johnson	I	SWSW	22	14N	54W	1		NE	n/a
4/10/2009	R. Johnson	I	SWSW	22	14N	54W	1		PE	n/a
4/14/2009	R. Johnson	I	SWSW	22	14N	54W	2		NE/PE	n/a
4/14/2009	R. Johnson	I	SWSW	22	14N	54W	1		PE	n/a
4/21/2009	R. Johnson	I	SWSW	22	14N	54W	1		PE	n/a
4/21/2009	R. Johnson	I	SWSW	30	14N	53W	1		PE	n/a
4/22/2009	R. Johnson	I	SESE	22	14N	54W	2		PE	n/a
4/29/2009	R. Johnson	I	SWSW	22	14N	54W	2		PE	n/a
5/6/2009	R. Johnson	I	SWSW	22	14N	54W	2		PE	n/a
5/14/2009	R. Johnson	I	SWSW	22	14N	54W	2		PE	n/a
5/19/2009	R. Johnson	I	SWSW	22	14N	54W	3	1AD 2+ Eaglets	PE	n/a
5/27/2009	J. Hart	I	SESE	24	14N	54W	1		SO	C
6/5/2009	R. Johnson	I	SWSW	22	14N	54W	3	1AD 2+ Eaglets	PE	n/a
9/24/2009	D. Bergum	I	NENE	32	14N	53W	1		PE	n/a
9/24/2009	D. Bergum	RLB	NENE	32	14N	53W	1		PE/FL	A

[1] I = incidental observations; RLB = observations during RLB surveys.
[2] AD = adult; 1st yr = first year eagle; Ju = juvenile.
[3] FL = flying; PE = perched; PE/FL = perched then flying; NE = nesting; SO = soaring.
[4] Flight Height A = 0-35 m above the ground; B = 36-135 m above the ground; C = >136 m above the ground.

3.2 2011 GOLDEN EAGLE USE

Golden eagle flight patterns and use is illustrated on maps in Appendices A and B.

Numerous golden eagle observations were recorded in 2011. More observations of golden eagle were recorded in 2011 than 2009 because more time was spent documenting golden eagle use throughout the day during each visit to the project area resulting in multiple observations per day. In 2011, a minimum of two days per each spring and fall avian survey (40 days) was spent recording golden eagle locations, flight patterns and flight heights. Golden eagles were observed at least once in 25 days of the 40-site visit days. Of the 25 days that golden eagles were observed, all but one of the observations were at the nest location in Section 22, T14N, R54W (Figure 3.2, Table 3.2, and Appendix A). This nest is easily viewed from County Road 24 and Avian Survey Points C or D; therefore, it was possible to monitor eagle movement throughout the day. Use of a particular grid was defined as at least one observation in a grid during a specific day. This eliminated multiple counts in specific locations such as the nest.

In 2011, the spring avian surveys were initiated on April 12 and continued weekly for 10 weeks until June 21, 2011. The eagle nest located in Section 22, T14N, R54W, was again active in 2011. The eagles were observed incubating on April 12 and 25 and May 2, 4, 10, 16, 17, and 26. On May 26, one adult and one eaglet were observed in the nest. On the June 2 site visit, no activity was observed at the nest, and no golden eagle incidental observations were recorded in the vicinity of the nest. The nest was investigated on June 7 and 8 during the 10.0-mi eagle nest inventory, and no eagles were observed. The nest was approached by two biologists after it was apparent that the adult eagles had abandoned the nest. No young could be seen in the nest, and no dead young were observed below the nest. Since no additional observations of the eaglet were made after May 26, it was speculated that the eaglet died sometime between May 26 and June 2. One adult golden eagle was observed again perched on the cliff above the nest site during a site visit June 14, but was not observed during the weekly avian surveys on June 16. Two eagles, one adult and one first year adult (with subadult plumage), were again observed perched above nest during the final avian survey on June 21. It was speculated that the first year adult may have been last year's young returning to the nest begging for food.

Figure 3.2 Golden Eagle Nest Adjacent to the STWF Project Area.

Most of the golden eagle activity during the spring/early summer of 2011 was noted within a 1.0-mi radius south of the nest and up to 2.5 mi north of this nest. The exception was during the first 2011 site visit on April 12 when a single golden eagle was noted in the extreme southwest corner of the project area (see Appendices A and B).

During the fall 2011 avian surveys, two golden eagles (one adult eagle, and one first year eagle) were observed on the nest or nest cliff weekly, resulting in multiple observations at the nest location. The birds were usually observed in the morning when the cliff ledge was in the shade. During the afternoon when the cliff was in the sun, the birds left the area and flew north and northwest outside of the project area. Flight height increased as distance from the nest increased. Based on 2011 observations, eagles observed greater than 1.0 mi from the nest were usually soaring at heights estimated at >135 m, which is above the general RSA of a 1.5-MW turbine.

Table 3.2 2011 Golden Eagle Observations, STWF Project.

Date	Observer	Type of Survey[1]	Location				Number of Eagles	Age[2]	Activity[3]	Flight Height[4]
			Q	SEC	T	R				
4/12/2011	J. Hart, M. Middleton	I		28	14	54	1	Ad	FL	B
4/12/2011	J. Hart, M. Middleton	I		25 & 36	14	54	1	Ad	SO	B/C
4/12/2011	J. Hart, M. Middleton	I	SW	22	14	54	2	Ad	IN/PE	
4/13/2011	J. Hart, M. Middleton	I	SW	22	14	54	1	Ad	IN	
4/25/2011	J. Hart, M. Middleton	I	SW	21	14	54	1	Ad	SO	C
4/25/2011	J. Hart, M. Middleton	I	NW	34	14	54	1	Ad	SO	C
4/25/2011	J. Hart, M. Middleton	I	SW	22	14	54	1	Ad	NE	
4/26/2011	J. Hart, M. Middleton	I	SE	22	14	54	2	Ad	PE	
4/26/2011	J. Hart, M. Middleton	I	SE	22	14	54	1	Ad	IN	
5/2/2011	M. Middleton	I	NE	22 & 28	14	54	1	Ad	FL	C
5/2/2011	M. Middleton	I	SE	22	14	54	1	Ad	PE	
5/3/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE/FL	A/B/C
5/3/2011	M. Middleton	I	SW	21	14	54	2	Ad	PE/FL	A/B/C
5/9/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE/FL	B/C
5/10/2011	M. Middleton	I	SE	15	14	53	1	Ad	SO	C
5/10/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE	
5/10/2011	M. Middleton	I	SW	22	14	54	1	JU	PE	
5/16/2011	M. Middleton	I	SW	22	14	54	2	Ad	PE	
5/16/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE/FL	A
5/26/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE	
5/26/2011	M. Middleton	I	SW	22	14	54	2	Ad	PE	
5/26/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE	
5/27/2011	M. Middleton	I	SW	10	14	54	1	Ad	SO	C
6/2/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE	
6/21/2011	M. Middleton	I	SW	22	14	54	1	Ad	PE/FL	A
6/21/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE/FL	
6/21/2011	M. Middleton	I	SW	22	14	54	2	1AD + 1st yr	PE	
6/22/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE/FL	A
6/22/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE	
8/18/2011	J. Hart	I	SW	22	14	54	1	AD	PE	
8/18/2011	J. Hart	I	SW	22	14	54	1	1st yr	PE	

Table 3.2 (Continued)

Date	Observer	Type of Survey[1]	Location				Number of Eagles	Age[2]	Activity[3]	Flight Height[4]
			Q	SEC	T	R				
8/19/2011	J. Hart	I	SW	22	14	54	1		PE	
8/23/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE	
8/23/2011	M. Middleton	I	SW	22	14	54	1	AD	PE	
8/24/2011	M. Middleton	I	SW	22	14	54	1	AD	PE	
8/24/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE	
8/30/2011	M. Middleton	I	SW	22	14	54	1	AD	PE	
8/31/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE	
8/31/2011	M. Middleton	I	NE	21	14	54	1	1st yr	FL	A/B/C
9/8/2011	J. Hart	I	SESE	13	13	54	2	AD	SO	B
9/14/2011	M. Middleton	I	SW	22	14	54	1	AD	PE	
9/14/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE	
9/15/2011	M. Middleton	I	SW	22	14	54	1	AD	PE	
9/15/2011	M. Middleton	I	SW	22	14	54	1	1st yr	PE	
10/11/2011	M. Middleton	I	SW	22	14	54	2	AD	PE	A/B/C
10/18/2011	M. Middleton	I	SW	22	14	54	1	AD	PE	
10/18/2011	M. Middleton	RLB	SWNW	13	14	54	1	AD	FL	A/B
10/18/2011	M. Middleton	RLB	SENW	21	14	54	1	AD	FL	A/B

[1] I = incidental observations; RLB = observations during RLB surveys.
[2] AD = adult; 1st yr = first year eagle; JU = juvenile.
[3] FL = flying; PE = perched; PE/FL = perched then flying; NE = nesting; SO = soaring; PE/FE = perched at nest and feeding young; IN = incubating. Flying is defined as flapping flight. Soaring is defined as nonflapping flight.
[4] Flight Height A = 0-35 m above the ground; B = 36-135 m above the ground; C = >136 m above the ground.

3.3 2011 10-MI GOLDEN EAGLE NEST INVENTORY

The inventory of golden eagle nest locations and spatial use was expanded to a 10-mi radius area in late spring of 2011 (Figure 3.3). The results are presented in TRC (2011b) and summarized here. Two TRC biologists conducted the ground-based survey, driving a combination of approximately 590 mi on June 7 and 8, 2011. The biologists surveyed approximately 559 mi^2 of potential golden eagle nest habitat. Three nest areas, in addition to the aforementioned golden eagle nest in Section 22, T14N, R54W, were identified in the 10.0-mi survey area (TRC 2011b). All of the nests were located on cliff ledges. Of the four golden eagle nests located, three nests (including the Section 22, T14N, R54W) were determined to be active in 2011. One active nest is located approximately 4.0 mi northeast of the project boundary. The second active nest, consisting of a three-nest complex, is located approximately 5.0 mi south of the project area and approximately 6.5 miles southeast of the project boundary.

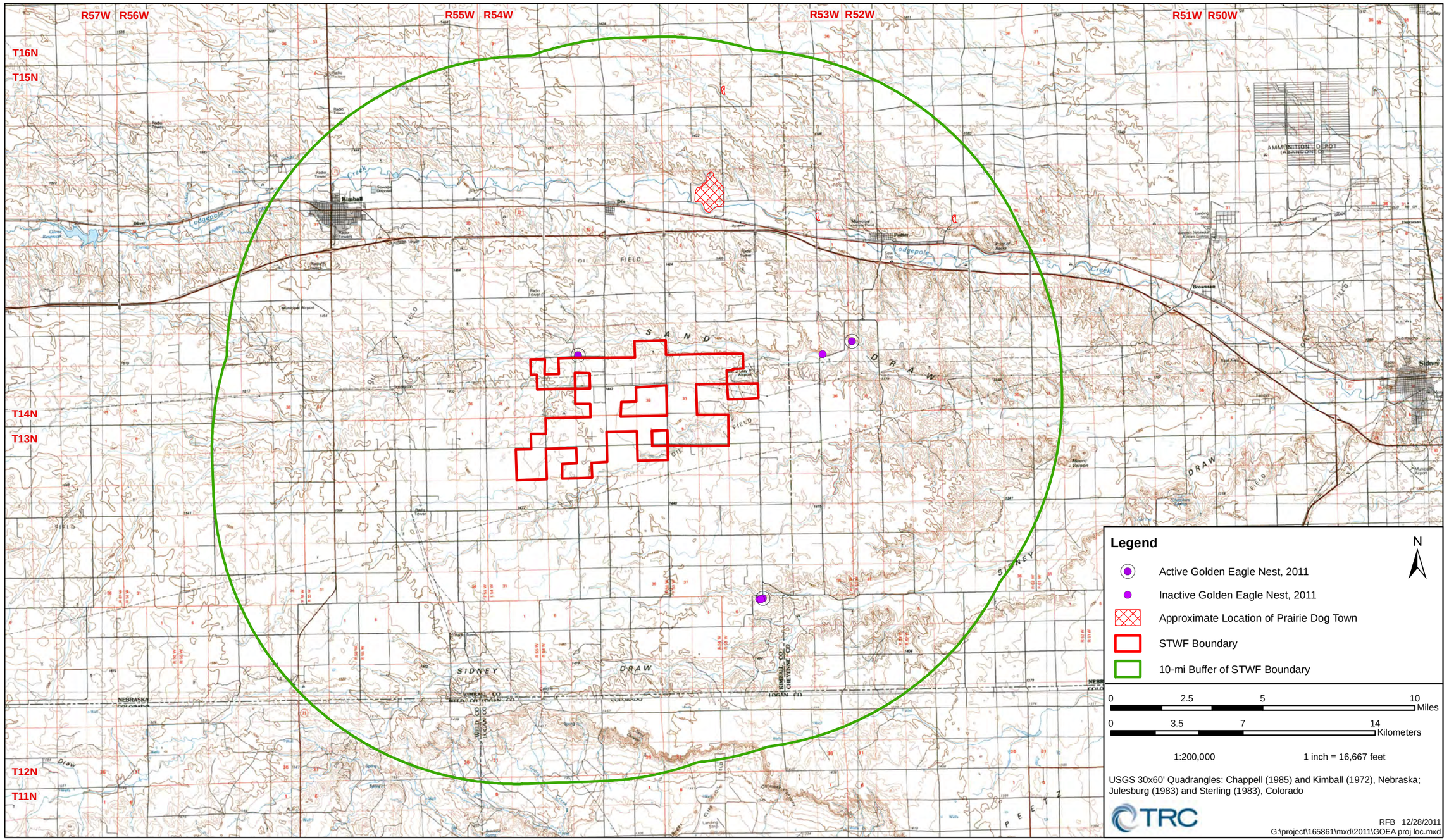


Figure 3.3 Location of Golden Eagle Nests Within a 10-mi Radius of the STWF Project Area, 2011.

4.0 SUMMARY

TRC developed and implemented a systematic sampling method to collect data on eagle use, and TRC biologists spent hundreds of hours observing golden eagles and other raptors. Based on 2009 and 2011 golden eagle observational and use data collected within and adjacent to the proposed STWF, eagles spatial use is concentrated in close proximately to the golden eagle nest located in SWSW Section 22, T14N, R54W (see Appendices A and B). When not in flight or not incubating eggs in the nest, eagles within or near the project area were often observed perched on the rock cliff adjacent to the nest or on a power pole along the county road within about 500 ft of the nest. Most flight patterns were generally north and outside of the project area; however, early in the season, several observations in early April 2009 and 2011 were noted approximately 3.0 mi south or east of the nest. Flight height increased as distance from nest increased. Preliminary observations indicate that eagles observed greater than 1.0 mi from the nest were usually soaring at heights estimated at >135 m, which is above the general RSA of a 1.5-MW turbine. Based on the 2009 and spring 2011 results of golden eagle use of the project area and flight heights, GEI relocated five turbines from their original turbine array that were located within 1.0 mi of the golden eagle nest located in Section 22, T14N, R54W. Results of the 2011 data support the decision to relocate the wind turbines in question, and it appears that the remaining wind turbines will pose a limited risk to golden eagles in the general project area.

In general, the habitat within the project area and vicinity is rolling shortgrass prairie and agricultural fields with few trees. Many vertical reliefs located in the project area and vicinity that could provide potential nesting habitat tend to consist of steep hillsides broken by relatively short outcrops of rock and ledges, which would not provide isolation from ground predators. Crags tall enough to provide isolated ledges do exist within the study area, but are not uniformly capable of providing suitable nesting habitat. In summary, the most suitable substrate capable of supporting the size and weight of a golden eagle nest in the project area or vicinity is the one occupied nest located in SWSW Section 22, T14N, R54W, and this nest has been used consistently for several years. In fall 2011, two adult eagle observations were about 5.0 to 6.0 mi south of this nest and may be related with another eagle territory associated with one of the other four nests identified during the 10.0-mi golden eagle nest inventory.

No prairie dog colonies occur in the STWF project areas. The closest prey source is likely the four prairie dog colonies located north of I-80 and more than 5.0 mi north of the proposed STWF project area. Because most of the eagle flights patterns are north of the STWF project area, it may be concluded that the eagles of this nest are likely utilizing these prairie dog colonies as a food source. In 2011, during the 10-mi eagle nest survey (TRC 2011b), one golden eagle was noted, perched on a rock overlooking one of these prairie dog colonies. No other prairie dog colonies or ground squirrel areas were observed in the project area or the 10.0-mi radius eagle nest inventory area.

5.0 REFERENCES

Cornell Lab of Ornithology. 2011. Golden Eagle, Life History. http://www.allaboutbirds.org /guide/Golden_eagle/lifehistory/ac. Accessed December 29, 2011.

Olendorff, Richard R. 1976. The Food Habits of North American Golden Eagles. *American Midland Naturalist*, Vol. 95, No. 1 (Jan., 1976), pp. 231-236. Published by: The University of Notre Dame <Stable URL: http://www.jstor.org/stable/2424254> accessed December 29, 2011.

Sibley, D.A. 2003. The Sibley Field Guide to the Birds of Western North America. Knopf, New York. 325 pp.

Tetra Tech EC, Inc. 2008. Raptor nest survey and habitat evaluation for listed wildlife and plant species, Kimball Wind Resource Area, Kimball County, Nebraska. Prepared for Generation Energy, Inc. July 18, 2008. 20 pp.

TRC Environmental Corporation. 2009. Spring raptor nest survey results, South Table Wind Farm, Kimball County, Nebraska. Letter Report. Prepared by TRC Environmental Corporation, Laramie, Wyoming, July 16, 2009. 3 pp. + appendices.

_____. 2010. Avian migration spring and fall migration monitoring studies, South Table Wind Farm, Kimball County, Nebraska. Prepared by TRC Environmental Corporation, Laramie, Wyoming, April 2010. 34 pp. + appendices.

_____. 2011a. Draft avian migration spring and fall migration monitoring studies, South Table Wind Farm, Kimball County, Nebraska. Prepared by TRC Environmental Corporation, Laramie, Wyoming, December, 2011. 48 pp. + appendices.

_____. 2011b. Ten-mile radius golden eagle nest inventory report, South Table Wind Farm, Kimball County, Nebraska. Letter Report. Prepared by TRC Environmental Corporation, Laramie, Wyoming, June 27, 2011. 5 pp. + appendices.

_____. 2011c. Spring raptor nest survey results, South Table Wind Farm, Kimball County, Nebraska. Letter Report. Prepared by TRC Environmental Corporation, Laramie, Wyoming, June 27, 2011. 3 pp. + appendices.

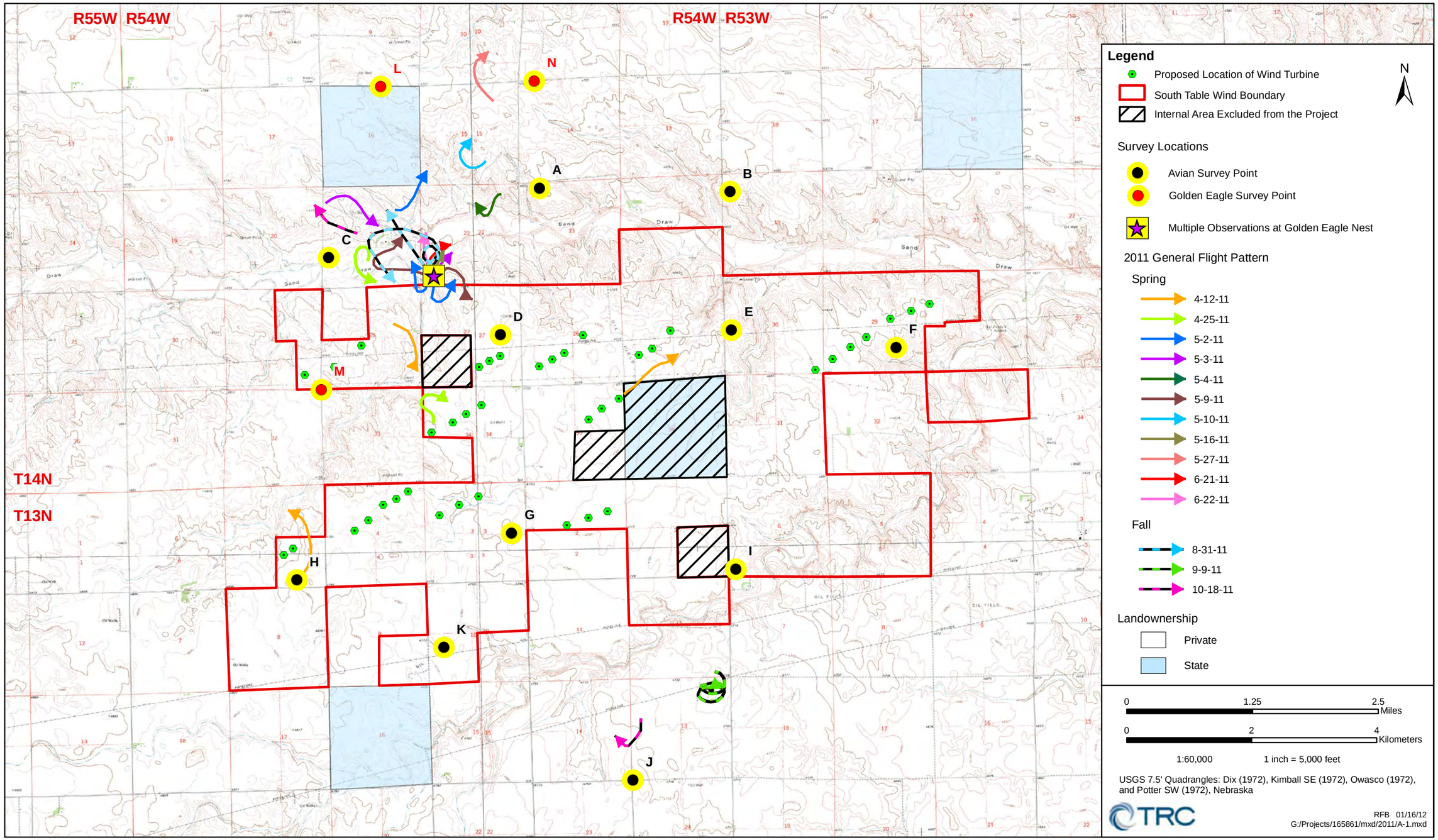
U.S. Fish and Wildlife Service. 2011a. Draft eagle conservation plan guidance. January 2011. 106 pp.

_____. 2011b. U.S. Fish and Wildlife Service draft land-based wind energy guidelines. February 2011. 60 pp. + appendices.

Western Area Power Administration. 2007. Scope of work for preparing an environmental assessment and related studies and documents. General requirements for interconnection. U.S. Department of Energy, Western Area Power Administration. 33 pp. + appendices.

APPENDIX A:

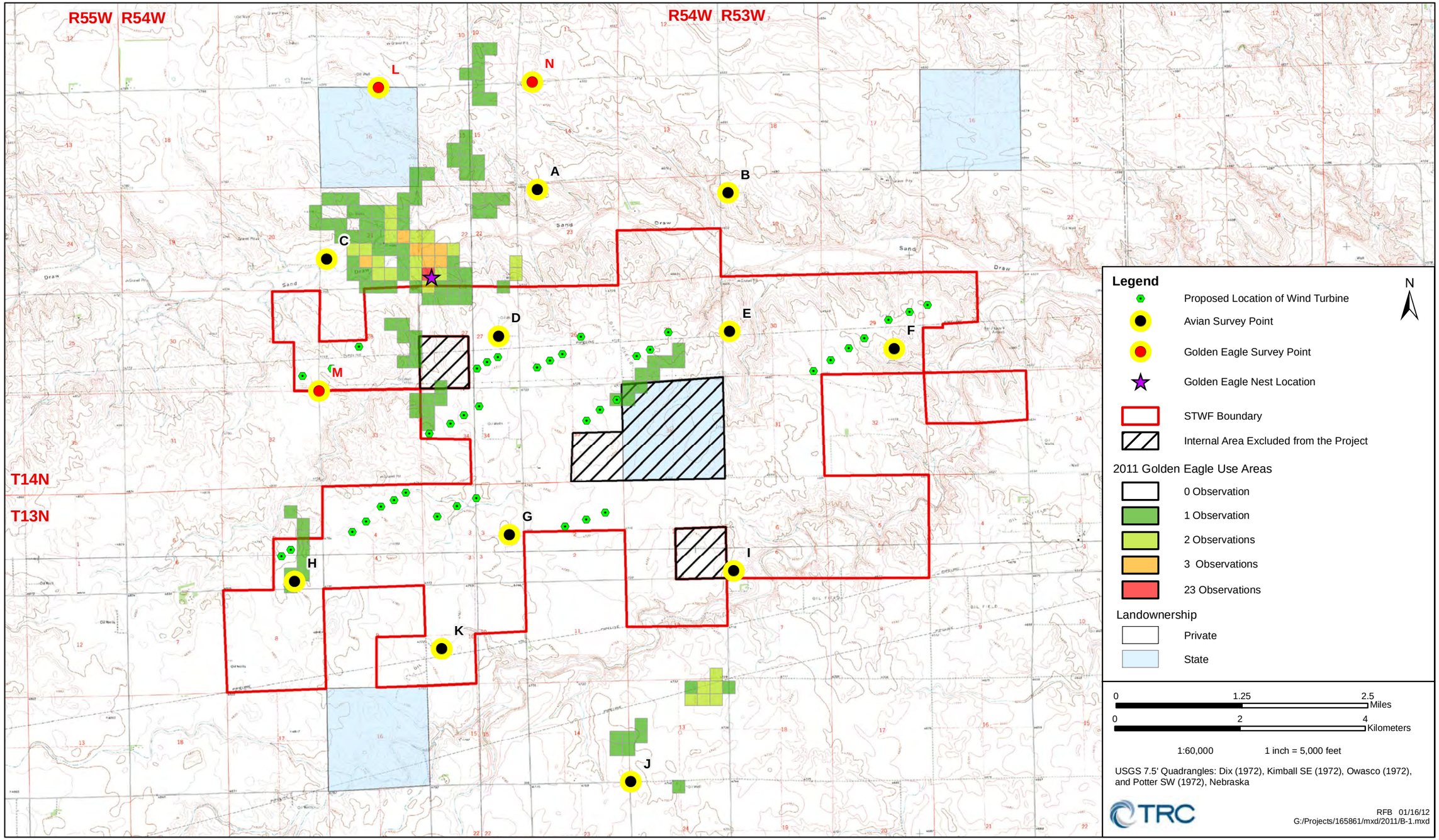
2011 GOLDEN EAGLE OBSERVATIONS AND
FLIGHT PATTERNS



Golden Eagle Observations and Flight Patterns, 2011, STWF Project Area.

APPENDIX B:

2011 GOLDEN EAGLE USE AREAS



Golden Eagle Use Areas, 2011, STWF Project Area.


TRC