Campbell County Wind Farm 2 Interconnection Request

Final Environmental Assessment

Campbell County, South Dakota

Western Area Power Administration

DOE/EA-2062

April 2025

Prepared by:

U.S. Department of Energy
Western Area Power Administration
Upper Great Plains Regional Office
2900 Fourth Avenue North
P.O. Box 35800
Billings, Montana 59101-1266
Phone: (406) 255-2800

Contractor Assistance Provided by:

Western EcoSystems Technology, Inc.
415 West 17th Street, Suite 200
Cheyenne, Wyoming 82001
Phone: (307) 634-1756

Project Applicant:

Campbell County Wind Farm 2, LLC
11051 South Dakota Highway 1804
Pollock, South Dakota 57648

Western Area Power Administration (WAPA) is aware that on February 25, 2025, the Council on Environmental Quality (CEQ) issued an interim final rule to remove its National Environmental Policy Act (NEPA) implementing regulations at 40 C.F.R. Parts 1500–1508. Based on CEQ guidance, and to promote completion of its NEPA review in a timely manner and without delay, in this Environmental Assessment (EA) WAPA is voluntarily relying on the CEQ regulations, in addition to Department of Energy's (DOE) own regulations implementing NEPA at 10 C.F.R. Part 1021, to meet its obligations under NEPA, 42 U.S.C. §§ 4321 *et seq*.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

List of Acronyms

Acronym	
ac	acre
ADLS	Aircraft Detection Lighting System
Analysis Area	Proposed Project Area and 2-mile buffer, collectively
APE	Area of Potential Effects
APLIC	Avian Power Line Interaction Committee
AU	avian use
AWBP	Aransas/Wood Buffalo whooping crane population
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	Best Management Practice
CAA	Clean Air Act
CCWF2	Campbell County Wind Farm 2, LLC
CFR	Code of Federal Regulations
CWA	Clean Water Act
dBA	A-weighted decibels
DOE	Department of Energy
EA	Environmental Assessment
ECPG	*Eagle Conservation Plan Guidance*
EMF	electric and magnetic field
EO	Executive Order

ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FEMA	Federal Emergency Management Agency
FMP	Fall Migration Period
FPPA	Farmland Protection Policy Act
FSA	Farm Service Agency
ft	foot
G	Gauss
GHGs	Greenhouse Gases
GIA	Generator Interconnection Agreement
HAP	hazardous air pollutant
HF	high frequency
ICNIRP	International Commission on Non-ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
IPaC	Information for Planning and Consultation
KOP	key observation point
kV	kilovolt
LF	low frequency
m/s	meters per second
MET	meteorological
mG	milligauss

mi	mile
mph	miles per hour
MW	megawatt
MWh	megawatt hour
NAAQS	National Ambient Air Quality Standards
NCA	National Climate Assessment
NEPA	National Environmental Policy Act of 1969
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NLCD	National Land Cover Database
NLEB	Northern Long-eared bat
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
PBA	Programmatic Biological Assessment
POI	point of interconnection
prairie grouse	greater prairie-chicken and sharp-tailed grouse, collectively

PSD	Prevention of Significant Deterioration
SCADA	supervisory control and data acquisition
SDBWG	South Dakota Bat Working Group
SDDANR	South Dakota Department of Agricultural and Natural Resources
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Game, Fish and Parks
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SPCC Plan	Spill Prevention, Control and Countermeasure Plan
SPP	Southwest Power Pool
SWPPP	Storm Water Pollution Prevention Plan
Tariff	Open Access Transmission Service Tariff
TCP	traditional cultural place
tpy	tons per year
UGP	Upper Great Plains
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
WAPA	Western Area Power Administration

WCS	Wildlife Conservation Strategy
WEI	Wind Erodibility Index
WEG	*Land-based Wind Energy Guidelines*
WOTUS	Waters of the U.S.
WQC	Water Quality Certification

1.0 Introduction

Western Area Power Administration (WAPA) is one of four power-marketing administrations within the U.S. Department of Energy (DOE). WAPA's mission is to "safely provide reliable, cost-based hydropower and transmission to our customers and the communities we serve." WAPA's customers include federal and state agencies, cities and towns, rural electric cooperatives, public utility districts, irrigation districts and Native American tribes. WAPA's customers, in turn, provide retail electric service to millions of consumers in the west.

Transmission capacity above the amount WAPA requires for the delivery of long-term firm capacity and energy to current contractual electrical service customers of the federal government is offered in accordance with its Open Access Transmission Service Tariff (Tariff). Since October 2015, WAPA's Upper Great Plains (UGP) Region has been a transmission owner member of the Southwest Power Pool (SPP), and its qualifying facilities are under the functional control of SPP. Excess transmission capacity on and interconnection to WAPA-UGP's facilities must be done in accordance with the SPP's Federal Energy Regulatory Commission (FERC) approved Tariff.

Campbell County Wind Farm 2, LLC (CCWF2), a subsidiary of RWE Clean Energy, proposes to construct Campbell County Wind Farm 2, a 98.6-megawatt (MW) wind farm (CCWF2 Project). The CCWF2 Project would be located within a roughly 12,000-acre (ac) area (CCWF2 Project Area) where CCWF2 has entered into agreements with local landowners interested in participating in Campbell County Wind Farm 2 (Figure 1.1-1). The area under consideration for the wind farm is located southwest of the town of Herreid in Campbell County, South Dakota, and 2.1 miles (mi) east of the Missouri River. As described further in Section 2.1 the location of facilities within the CCWF2 Project Area have been further refined based on a variety of considerations. CCWF2 submitted an interconnection request to SPP to connect the Campbell County Wind Farm 2 to WAPA-UGP's transmission system at the Bismarck to Glenham 230-kilovolt (kV) transmission line at the existing Campbell County Substation.

1.1 National Environmental Policy Act

NEPA requires federal agencies to consider the potential effects of its proposed actions and any alternatives on the human environment, and to take action to protect, restore, and enhance the environment during and after construction. WAPA follows the Department of Energy's regulations implementing NEPA at 10 C.F.R. Part 1021 to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

WAPA considers and acts upon requests for interconnection to WAPA's transmission facilities and the modifications necessary to accommodate the interconnections but does not directly authorize or permit the developer's generation projects, such as wind energy development projects. As part of its evaluation, WAPA is required to analyze the potential impacts of the modification of WAPA facilities to accommodate the interconnection. CCWF2's private development of a wind farm and its environmental effects are also described and disclosed in this Environmental Assessment (EA).

This EA tiers to the analysis conducted in the 2015 *Upper Great Plains Wind Energy Programmatic Environmental Impact Statement* (2015 PEIS), a document prepared jointly by WAPA and the U.S. Fish and Wildlife Service (USFWS; 2015).

The 2015 PEIS analyzed the common environmental impacts resulting from development of wind energy projects, the effectiveness of Best Management Practices (BMPs), avoidance of sensitive areas, and mitigation measures in reducing potential impacts. Impacts and mitigation were analyzed in the 2015 PEIS for each environmental resource and all components of wind energy projects were addressed, including turbines, transformers, underground systems of electrical collection cables (collector lines), overhead lines, access roads, substation installations, and operational and maintenance activities. This tiered EA incorporates the common environmental impacts, by reference, and provides a focused review of Project-specific resources (e.g., soil type, watershed characteristics, wildlife habitat, vegetation, viewshed, public concerns, threatened and endangered species, and cultural resources) and Project-specific design. The 2015 PEIS common environmental impacts were reviewed and remain valid. Where site specific effects may be different, those additional analyses are included in this EA. The 2015 PEIS is available online at: https://www.wapa.gov/regions/UGP/Environment/Pages/Programmatic WindEIS.aspx

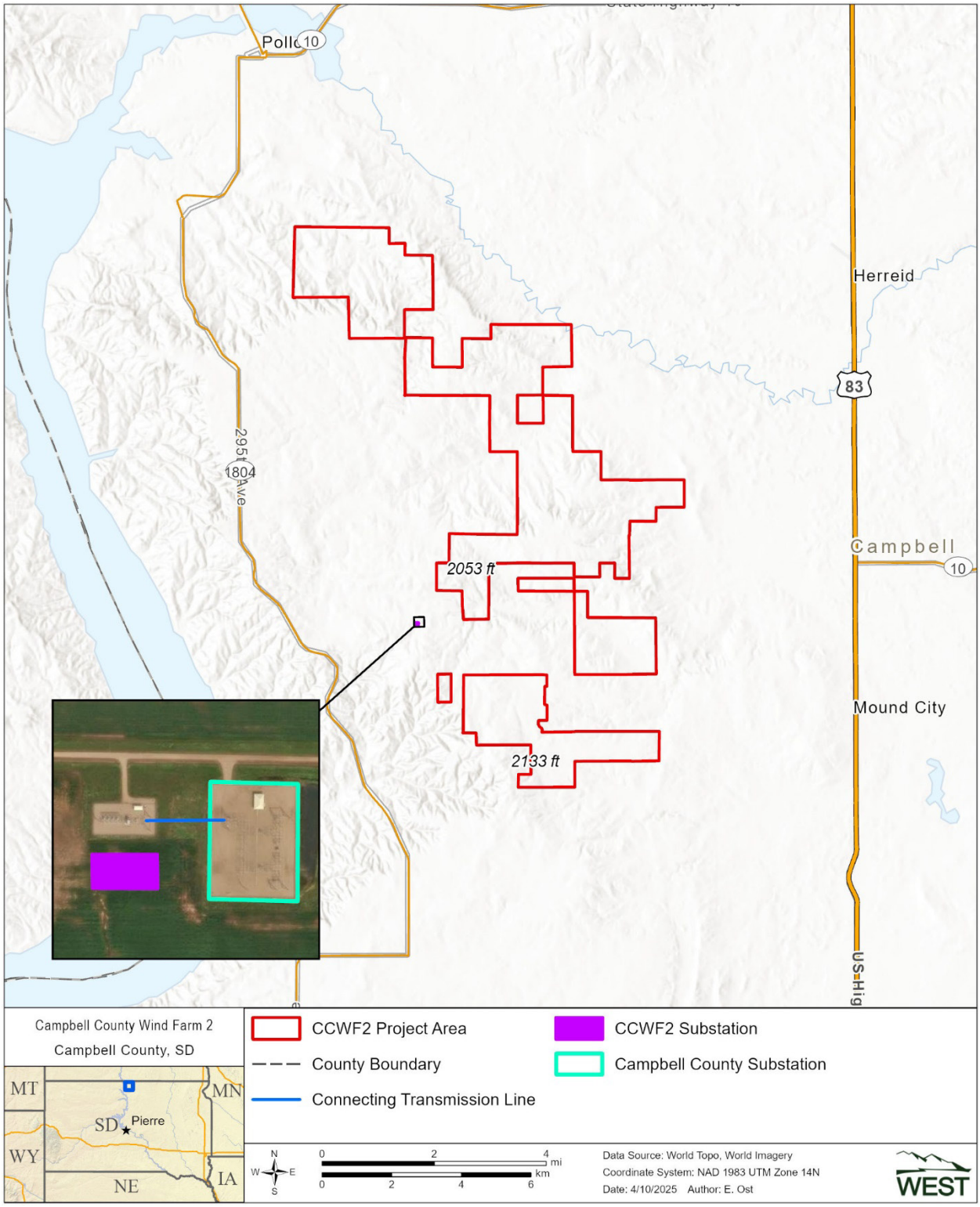

Figure 1.1-1 Location of the proposed Campbell County Wind Farm 2.

1.2 Purpose and Need for Federal Action

WAPA's purpose and need is to consider whether to proceed with the interconnection request by CCWF2, in accordance with the SPP Tariff and the Federal Power Act, as described in Section 1.1.1 of the 2015 PEIS.

1.3 Goals and Objectives of Campbell County Wind Farm 2, LLC

CCWF2's goals and objectives are to provide an economically sustainable, reliable, and cost-effective source of renewable energy to energy users. To accomplish these goals and objectives, the wind farm must be technically, environmentally, and economically feasible.

2.0 Description of Proposed Action and No Action Alternatives

This EA analyzes two alternatives: the Proposed Action Alternative and the No Action Alternative, defined below.

2.1 Proposed Action Alternative

WAPA must consider whether to proceed with CCWF2's interconnection request in accordance with the SPP's FERC-approved Tariff and the Federal Power Act. The Proposed Action is for WAPA to proceed with the Proposed Wind Farm's transmission system interconnection request and modify WAPA facilities to accommodate the interconnection, which includes:

- Construction of a new Point of Interconnection along the existing Bismarck to Glenham 230-kV transmission line
- Modification of a bay within the existing WAPA Campbell County Substation.

CCWF2's private development of the Proposed Wind Farm and its environmental effects are described and disclosed in this EA. CCWF2's Proposed Wind Farm includes:

- up to 29 wind turbines;
- up to 10.3 mi of new access roads;
- four temporary meteorological (MET) towers;
- one permanent MET tower;
- potential installation of Aircraft Detection Lighting System (ADLS) at the turbines and permanent MET tower;
- up to 30.7 mi of underground electrical collector systems;
- a fiber optic communication system;
- expansion of an existing substation to include a new CCWF2-owned 0.6 ac substation facilities near the WAPA POI;
- replacement of an existing overhead transmission line with 277 feet (ft) of 230-kV overhead transmission line (gen-tie line) to the WAPA POI; and
- a 20.0-ac temporary laydown/staging area and concrete batch plant.

CCWF2 would construct, own, and operate the private Proposed Wind Farm in Campbell County, South Dakota. The Proposed Wind Farm is a private action developed independently by CCWF2. WAPA does not have the authority to approve or deny a privately developed, owned, and operated wind farm. WAPA's actions and CCWF2's private development of the Proposed Wind Farm and their effects are disclosed in this EA. WAPA's Federal action and the private action are hereafter collectively referred to as the Project.

2.1.1 Project Description and Construction

Section 3.3 of the 2015 PEIS provides an overview of typical wind farm site construction activities and Section 3.5 describes decommissioning, both of which entail similar footprints. Both construction and decommissioning activities conducted by the CCWF2 Project would be similar to those described in the PEIS. CCWF2 Project-specific details are described below. Construction activities would last approximately 15-21 months, and decommissioning activities would last approximately 12-15 months. Project operation would continue for approximately 35 years.

Table 2.1-1 summarizes the temporary and permanent footprint of each Project component based on the layout for the Project (Figure 2.1-1). This layout includes minor turbine shifts and infrastructure moves based on tribal, agency, and public comments on the Draft EA, negotiations with landowners, geotechnical evaluations, field surveys, and the results of the analysis in the Draft EA. If additional shifts should become necessary following publication of the Final EA, CCWF2 would notify WAPA of these shifts to determine whether additional analysis is necessary.

Table 2.1-1. Estimated footprint for the Project.

Project Component	Temporary Land Requirements - Construction and Decommissioning		Permanent Land Requirements - Operations	
	Dimensions	Total Area (acres)[a]	Dimensions	Total Area (acres)
Federal Action				
Point of interconnection (Western Area Power Administration facility)	N/A	N/A	Area within existing facility.	0.8
Federal Action Total	**—**	**0.0**	**—**	**0.8**
Private Action (CCWF2 Project)				
Turbines[b]	Approx. 150-foot radius area around each turbine	40.6	55-foot radius around each turbine	6.3
New access roads	50-foot width centered on road centerline	42.9	16-foot width centered on road centerline	20.0
Grading limits	Variable based on each turbine and access roads leading to turbine.	244.6	N/A	N/A

Project Component	Temporary Land Requirements - Construction and Decommissioning		Permanent Land Requirements - Operations	
	Dimensions	Total Area (acres)[a]	Dimensions	Total Area (acres)
Collector lines and collocated fiber optic communication system	100-foot width centered on route centerline	238.1	N/A	N/A
Proposed substation expansion	Approx 600-foot by 500-foot	3.0	Approx 230-foot by 110-foot	0.6
Overhead transmission line (gen-tie line)[c]	150-foot width centered on route centerline	1.4	Single pole structure, less than 2 feet in diameter	<0.1
Temporary Met Towers (4), temporary LiDAR	125-foot radius around the tower location, 6-foot by 6-foot LiDAR	1.3	82-foot radius around the tower location	1.0
Permanent MET tower	Approx 112-foot by 112-foot	0.3	Approx 12-foot by 12-foot	<0.1
Laydown/staging/batch plant area[d]	Approx 1,600-foot by 770-foot	20.0	N/A	N/A
CCWF2 Project Total[e]	**—**	**592.1**	**—**	**27.9**
Project Total (adjusted for overlapping components)[e]	**—**	**413.3**	**—**	**28.5**

a. Temporary acreage calculation is the temporary land requirements minus long-term (operation) land requirements.

b. Acreages in the table reflect the actual number of Project components. Since more than one location is being considered for some components, impacts that could occur from all potential locations are assessed in Section 3.0 of this Environmental Assessment.

c. Land use and vegetation within the proposed right-of-way for the overhead transmission line is expected to be returned to pre-construction conditions, except for land replaced by pole installation.

d. Area shown is the maximum size of potential disturbance.

e. Sums may not equal totals shown due to rounding.

CCWF2 Project facilities within the CCWF2 Project Area are sited to maximize energy production while avoiding or reducing potential cultural and tribal, wetland, wildlife, visual, sound, and other impacts, to the greatest extent possible and in compliance with landowner agreements, government regulations, state recommendations, and county setback and siting requirements. These requirements are shown in Table 2.1-2.

Table 2.1-2. Project siting requirements and recommendations for the CCWF2 Project.

Agency	Requirement/Recommendation
Setbacks	
South Dakota Game, Fish and Parks (SDGFP) Recommendations	Untilled grasslands, large grassland blocks (160 acres or more) and grasslands with native plant species are of particular importance and special care should be taken to avoid placing turbines in these areas. SDGFP recommends avoiding siting turbines in grassland habitats, particularly untilled native grasslands.
	SDGFP recommends avoiding siting turbines in wetlands or within wetland complexes (multiple wetland basins adjacent to each other).
	If siting of project infrastructure in grassland habitats cannot be avoided, SDGFP recommends a 1-mile setback of project infrastructure from active prairie grouse leks to minimize impacts to prairie grouse.
	To avoid impacts to tree roosting bats, SDGFP recommends siting turbines at least 1,000 feet away from suitable bat habitat (e.g., forested areas, woody draws).
	SDGFP recommends not siting turbines within or immediately adjacent to prairie dog colonies to reduce disturbance to habitat, as well as to reduce the risk of collision for avian predators that may forage in prairie dog colonies.
Campbell County Zoning Ordinance Requirements	Distance from an incorporated municipality shall be at least 5,280 feet or one mile. Distance to be measured from the incorporated municipality boundary to the base of the wind energy system turbine.
	Distance from existing off-site residences, businesses, churches, and buildings owned and/or maintained by a governmental entity shall be at least 3,960 feet. Distance from on-site or lessor's residence shall be at least 500 feet. Distance to be measured from the wall line of the neighboring principal building to the base of the wind energy system turbine.
	Distance from any property line shall be 500 feet or 110% of the height of the wind turbine, whichever distance is greater. The vertical height of the wind turbine is measured from the ground surface to the tip of the blade when in a fully vertical position. The horizontal setback shall be measured from the base of the turbine to the adjoining property line unless wind easement has been obtained from adjoining property owner.
	The turbines shall be spaced no closer than three rotor diameters (measurement of blades tip-to-tip) within a straight line. If required during final micro-siting of the turbines to account for topographic conditions, up to 10% of the turbines may be sited closer than the above spacing, but the permittees shall minimize the need to site the turbines closer.
	Distance from centerline of public roads shall be 500 feet or 110% of the height of the wind turbine, whichever distance is greater.
Noise	
Campbell County Zoning Ordinance Requirements	Noise level shall not exceed 45 A-weighted decibels, average A-weighted sound pressure, including constructive interference effects at the perimeter of the principal and accessory structures of existing off-site residences, businesses, and buildings.

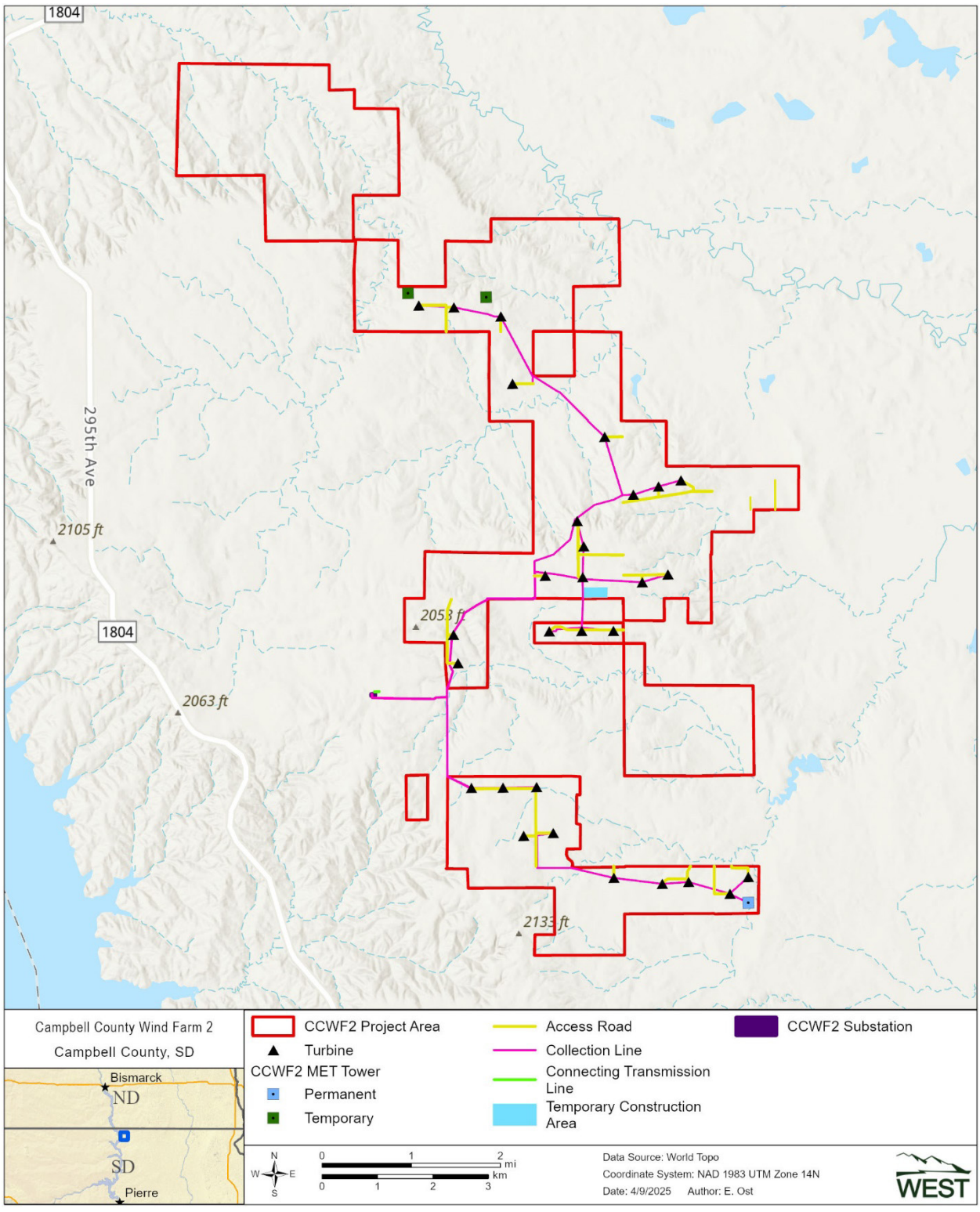

Figure 2.1-1. CCWF2 Project layout.

2.1.1.1 Point of Interconnection

To accommodate the interconnection request, WAPA would construct a new POI along the existing Bismarck to Glenham 230-kV transmission line at an existing bay within WAPA's existing Campbell County Substation. The POI would occupy an estimated 0.8 ac and house equipment, such as breakers, relays, communications and control equipment, and aboveground bus structures. The POI would be constructed in accordance with a GIA between WAPA and CCWF2.

2.1.1.2 230-kilovolt Overhead Transmission Line

CCWF2 would replace an existing, privately-owned overhead transmission line from the existing, privately-owned Campbell County 1 Project Substation with 277 ft of 230-kV overhead transmission line (the gen-tie line). The gen-tie line would connect CCWF2's proposed Project substation (see Section 2.1.1.3 below) to WAPA's new POI on the south side of WAPA's existing Campbell County Substation (Figure 2.1-2). The area around the POI will contain the transmission line corridor and appurtenant equipment.

CCWF2 would utilize a 150-foot-wide temporary workspace centered on the route to construct the gen-tie line. This workspace would contain vehicles and equipment to construct the single gen-tie pole and string the conductor. Areas temporarily disturbed during construction would be restored to preconstruction land use.

2.1.1.3 Campbell County Wind Farm 2 Project Substation

A step-up substation would be constructed for the Project to interconnect with WAPA's existing Campbell County Substation. The proposed Project substation (CCWF2 Substation) would be constructed through an expansion to the south of the existing Campbell County Wind Farm 1 Project Substation (Figure 2.1-2). The expanded footprint would be fenced, and equipment enclosures would be included at the substation site to protect electrical equipment from the elements. No new roads or parking areas would be associated with the CCWF2 Substation. As described in Section 2.1.1.2 above, the existing overhead transmission line associated with the Campbell County Wind Farm 1 Project Substation would be replaced rather than constructing a new overhead route.

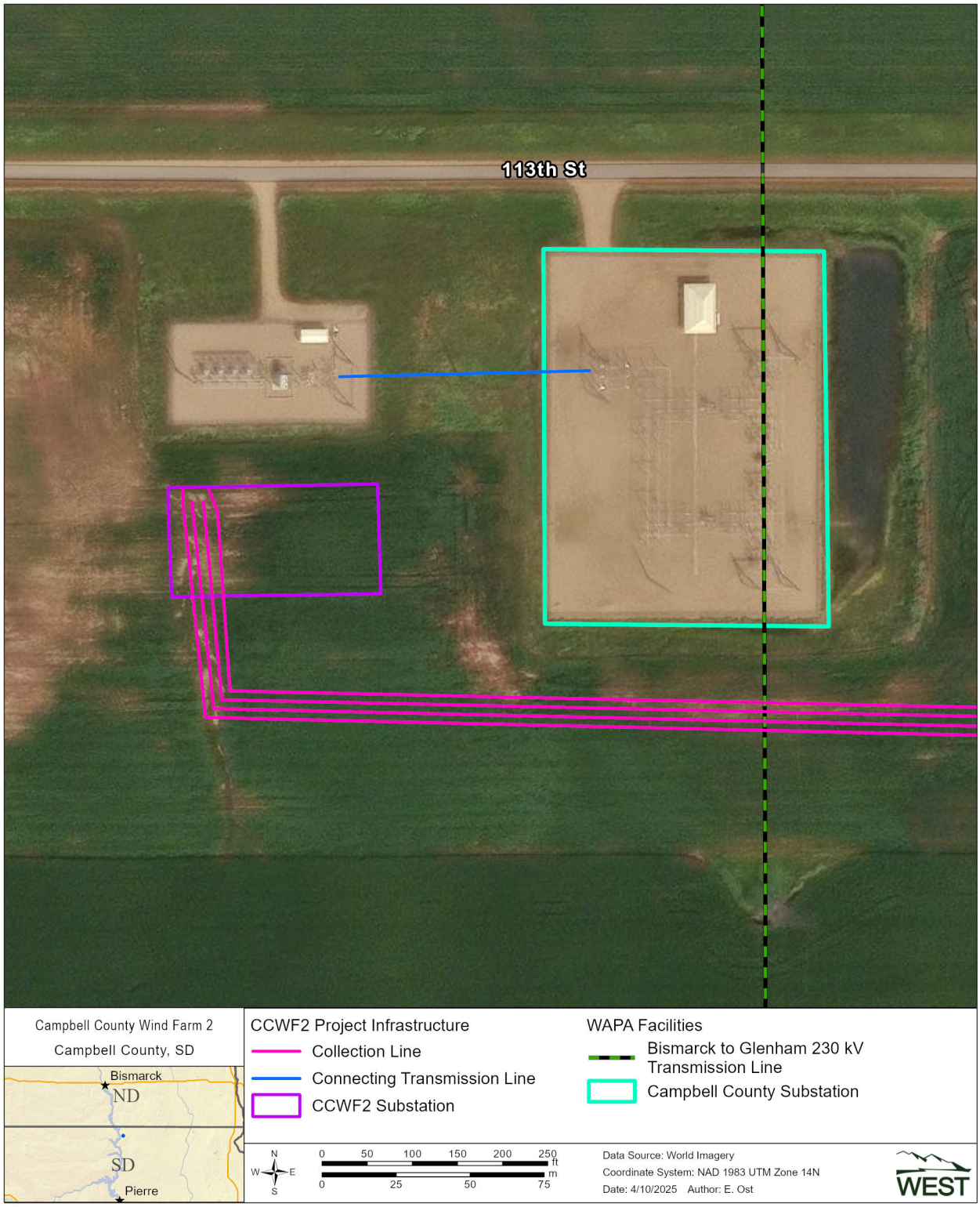

Figure 2.1-2. Proposed interconnection at WAPA's Campbell County Substation.

2.1.1.4 Wind Turbines

This EA evaluates 31 turbine locations: 29 primary locations and two alternate locations. CCWF2 plans to install only 29 wind turbines. CCWF2 has proposed installing General Electric (GE) 3.4 MW-140 turbines, each turbine having a hub height of 322 ft and a rotor diameter of 459 ft, with a corresponding blade length of 204 ft. The total rotor-swept area for each turbine would be 165,700 sq ft. The tip height of the turbine blade in the 12 o'clock position would be almost 551 ft.

CCWF2 coordinated with the Federal Aviation Administration (FAA) and received a Determination of No Hazard to Air Navigation for all turbines and proposed MET towers. Turbine towers would be painted a non-glare, off-white, or gray color, and be marked and lit in accordance with *FAA circular 70/7460-1M, Obstruction Marking and Lighting*.

The wind turbine foundations are typically made of concrete and steel and buried underground at a depth of up to 10 ft, except for approximately 12 inches that would remain aboveground to allow the tower to be bolted to the foundation. A transformer, called a "step-up transformer," would be installed at the base of each wind turbine to increase the output voltage of the wind turbine to match the voltage of the power collection system (34.5 kV).

During construction, an approximately 150-ft radius area would be graded and cleared to lay down the rotors and maneuver cranes during turbine assembly. After construction, a 55-ft radius area around each turbine would be maintained and graveled to prevent potential damage to the underground foundations and cabling. Areas temporarily disturbed during construction would be restored to preconstruction land use.

2.1.1.5 Access Roads and Crane Paths

CCWF2 anticipates using approximately 19 mi of existing public roads, private roads, and field paths, plus constructing up to 10.3 mi of new private access roads to reach CCWF2 Project components. Existing public roads would not be widened, with the exception of temporary grading at tight intersections before or during construction to accommodate heavy equipment with a larger turning radius, and a gravel cap may be added on top of existing county roads. New access roads would generally be constructed in a 50-foot-wide right-of-way and may include additional grading beyond the 50-foot width on a case-by-case basis. After construction, these roads would be narrowed to approximately 16 ft in width, or their original width, and would be all-weather, gravel surfaced. Roads should include appropriate drainage controls, such as culverts. Gates would be installed where access roads cross landowner fences, with landowner approval.

Separate access may be required for the cranes used to erect the turbines. Because large construction cranes may spend as little as one day at each turbine site before moving on to the next, cranes are sometimes moved cross-country rather than using developed access roads. Where cranes are required to travel cross-country, workers would lay down some form of cribbing, bedding, or mats to support the weight of the crane, minimizing impacts to the

underlying ground. The cribbing, bedding, or mats would be removed immediately after the crane passes by to be re-used elsewhere.

Section 3.10 of the 2015 PEIS describes the common transportation operations necessary for the construction and operation of a commercial wind farm, while Section 4.1.3.4 of the 2015 PEIS describes several types of roads to be considered for constructing a wind farm.

2.1.1.6 Laydown Yard, Staging Area, and Concrete Batch Plant (Temporary Construction Area)

CCWF2 would grade a temporary construction area up to 20.0 ac in size to accommodate a construction laydown and staging area, as well as use for a temporary concrete batch plant. The laydown and staging area would provide parking for construction personnel and a staging area for large equipment deliveries. The laydown yard and staging area would also be used to conduct maintenance on construction equipment and vehicles and to store fuel. Figure 3.3 of the 2015 PEIS shows an example of a temporary work/staging area.

Within the temporary construction area, CCWF2 intends to construct a temporary concrete batch plant. The temporary batch plant would include mixing equipment, storage tanks, and silos for material storage, sand, and gravel. The temporary batch plant would also include designated areas for loading, unloading, and washing. Areas temporarily disturbed would be restored to preconstruction land use.

2.1.1.7 Operations and Maintenance Facility

CCWF2 would utilize the existing O&M Facility for Campbell County Wind Farm 1, located west of the CCWF2 Project Area. The CCWF2 Project would be operated locally from a control room in the O&M building. An oil containment building would be constructed adjacent to the existing O&M facility, the footprint of which would be approximately 30 feet by 45 feet.

2.1.1.8 Meteorological Towers

CCWF2 proposes to construct one permanent MET tower and four temporary MET towers. The permanent MET tower is expected to be free-standing with no guy wires, have a height of 322 feet and use markings and lighting as stipulated by the FAA determination for the Project. It would remain in place throughout the life of the Project.

For site calibration, pairs of temporary MET towers would be constructed at two turbine locations. One tower would be located upwind of the turbine and one tower would be placed at the turbine location (prior to the turbine installation). Once sufficient data is available the towers on the turbine locations would be decommissioned and removed from the CCWF2 Project Area, prior to construction of the turbine. After sufficient data is collected, the two temporary towers upwind of turbine locations would be taken down and removed from the CCWF2 Project Area. A temporary mobile LiDAR equipment would be located at the southwestern corner of the CCWF2 Project Area and encompass a 6 x 6-foot area.

2.1.1.9 Aircraft Detection Lighting System

CCWF2 is coordinating with the FAA to determine whether installation of an ADLS would be needed for the Project turbines and permanent MET tower. ADLS enables the turbine and MET tower lighting to be turned off unless an aircraft is in the vicinity. ADLS uses radar to detect aircraft a specified distance away. When aircraft are detected, the ADLS sends a signal that turns on the turbine and MET tower lighting. Once the aircraft has moved out of the detection area, the ADLS sends out a signal to turn the lights back off. Proposed land requirements of the turbines and MET towers would accommodate ADLS equipment construction if it is installed.

2.1.1.10 Underground Collection Lines and Communication System

From the step-up transformers at each turbine, generated power would run through collector lines to the CCWF2 Substation. The CCWF2 Substation would increase the voltage to 230 kV to tie into WAPA's transmission system. Up to 30.7 mi of underground circuits would be installed, either by trenching, plowing, or directionally boring the cables underground. Some of the construction disturbance for the underground collection system would be shared with construction disturbance for other Project facilities where these facilities overlap. The ground surface above the lines would be revegetated, but no trees would be permitted above the lines. The collector lines would be buried to a minimum depth of 48 inches with marking tape and tracer wire to meet the appropriate national electrical code. CCWF2 would register the appropriate underground facilities with the South Dakota One-Call system.

CCWF2 would install fiber optic cables to link each turbine to the collection substation. The fiber optic cables allow the turbines, collection substation, and electrical grid to communicate as part of supervisory control and data acquisition (SCADA), a system to monitor safety and control mechanisms. The SCADA system also allows the Project to be remotely monitored, which increases Project oversight and performance and reliability of the turbines. The electrical collection system and fiber optic cables would be placed in the same trench and would include occasional aboveground junction boxes.

Additionally, up to 277 ft of communications fiber cable would be installed between the POI and Project collection substation with the replacement of the overhead transmission line.

2.1.2 Project Operation and Maintenance

Section 3.4 of the 2015 PEIS describes the typical activities that would occur during operation and maintenance of a wind project. Similar types of activities would occur for the Project.

Construction of the Project is expected to begin by Q2 of 2025 at the earliest and last for approximately two years, with an estimated commercial operation by Q4 2026. The expected operational life of the Project is 35 years.

The Project would be operated locally from the control room in the existing O&M building for Campbell County Wind Farm 1, located west of the CCWF2 Project Area. A permanent staff of four to five on-site personnel would provide O&M support activities to the Project.

2.1.2.1 CCWF2 Substation

Operation and maintenance associated with the CCWF2 Substation would include remote monitoring, in-person inspections, online testing, and vegetation removal within the fenced substation site. CCWF2 may occasionally power-off the substation to complete testing, maintenance, and cleaning, which would otherwise be too dangerous to do when the substation is energized. Equipment replacement would occur on an as-needed basis (e.g., due to damage or failure). All repair work would occur within the fenced 0.6-ac area.

2.1.2.2 230-kilovolt Overhead Transmission Line

CCWF2 would own, operate, and maintain the replacement gen-tie line. This would include visual inspections of the conductor and pole structures and replacing these facilities when necessary. Inspections would occur on foot, due to the short distance, within the existing easement. In rare instances, inspectors may need to use a bucket truck or climb the transmission structures. Repairs and replacements would be accomplished within the easement area using standard equipment, such as bucket trucks. Bird diverters would be maintained by CCWF2 for the life of the gen-tie line. Maintenance of vegetation within the easement may include periodic tree and bush trimming, application of herbicide, or both.

2.1.2.3 Point of Interconnection

WAPA would retain ownership and management of the Campbell County Substation, including the new POI.

2.1.2.4 Wind Turbines

Each wind turbine would include a SCADA operations and communications system that allows automated independent and remote operation of the turbine. The SCADA data provides detailed operating and performance information for each turbine, allowing real-time control and continuous monitoring to ensure optimal operation and identification of potential problems. A local wind technician would be either on-site or available on-call to respond in the event of emergency notification or critical outage.

Turbines would operate above the manufacturer's cut-in speed (when winds are at 3.0 meters/second [m/s] or 6.7 miles per hour [mph]) except when time-of-year restrictions apply to protect sensitive species, at which point higher cut-in speeds would be implemented with blades feathered below cut-in speeds (i.e., rotated so as not to turn). Turbines would also be feathered when certain wind speeds are exceeded for safety reasons (as determined by the manufacturer). Any additional curtailment needed for federally protected species would be implemented based on risk and voluntary conservation measures set forth in the 2015 PEIS,

Programmatic Biological Assessment (PBA), and/or through Endangered Species Act (ESA) consultation with the USFWS (see Section 3.5).

A preventative maintenance and inspection schedule would be implemented for the Project. Maintenance of the wind turbines would include visual turbine inspections, remote activities, such as turbine resets and troubleshooting, and other upkeep activities. All major components of the wind turbines would undergo routine maintenance on schedules established by the component manufacturer. Routine maintenance activities occur biannually. Routine maintenance would first occur one month after commercial operation has begun. After that, maintenance would be performed at 6- and 12-month intervals. Additional service and repairs would be done as needed. In most cases, this would involve replacing lubricating oils and coolants in transmissions and motors and using small amounts of grease, lubricants, paints, and/or coatings for corrosion control. Turbine maintenance activities would be conducted at turbine locations.

On occasion, turbines can experience malfunctions, such as equipment failure, which require non-routine maintenance work. Over the life of the turbines, some mechanical components may need repair or replacement; however, most turbine designers construct their turbines in modular fashion. Thus, it is likely that most major overhauls or repairs of turbine components would involve removing the components from the site to a designated off-site repair facility. Some repair activities may require the use of heavy equipment, such as cranes, to assist in the repairs of components, such as the rotor, turbine blades, and nacelle components. Cleaning of a rotor could happen on a rare individual basis but would not be routine practice. This practice would only occur if the rotor assembly were already lowered from the drive train assembly for maintenance work.

Vegetation management at the turbine pads would include mowing and herbicide use as needed to control invasive or noxious weeds. Mowing would occur during daytime hours. The need for mowing would be evaluated by site operations staff periodically during the growing season. Herbicides and pesticides, if necessary, would be applied in accordance with local regulations and all U.S. Environmental Protection Agency (USEPA)-approved labeling.

2.1.2.5 Access Roads and Crane Paths

New access roads would be narrowed to approximately 16 ft after construction. Turbine access roads on private lands would be maintained by CCWF2. This could include dust control, grading, or placement of additional gravel as needed. Maintenance of county roads within the site would be the responsibility of the respective county; however, CCWF2 would be responsible for any road damage caused by maintenance or warranty work.

Temporary crane paths would be restored and returned to pre-construction land use after construction. Temporary bridges or culverts would be removed, and riparian areas would be stabilized and restored.

2.1.2.6 Meteorological Towers

Two of the four temporary MET towers would be removed prior to construction of the Project. The remaining two temporary MET towers would remain on site for up to four years after construction is complete, at which point they would also be removed. The permanent MET tower would remain on site for the operational lifetime of the Project. The MET towers would be regularly inspected and maintained. Maintenance and repair activities, when needed, would be contained within a 0.02-ac area at each tower.

2.1.2.7 Aircraft Detection Lighting System

If installed under the direction of the FAA, ADLS would be regularly inspected and maintained. Maintenance and repair activities, when needed, would be contained within the turbine and permanent MET tower footprints.

2.1.2.8 Underground Collection Lines and Communication System

Operation and maintenance of the underground collection system and co-located fiber optic communication system would include remote monitoring of the systems, visual inspections of the aboveground junction boxes via vehicles or walking the collection line route, and collection line repair or maintenance as needed. If repairs are needed for the underground collection system or fiber optic communication system, disturbance would occur within the confined areas of previous construction disturbance (25 to 125-ft wide right-of-way centered on the collection line).

2.1.3 Repowering/Decommissioning

The projected operating life of the Project turbines is 35 years. After the useful life of the turbines is complete, the Project would be assessed for the viability of either repowering, by installing new or refurbished turbines or turbine components, or complete decommissioning. Any retrofits and/or upgrades after 35 years may require further approvals from Campbell County. Additionally, CCWF2 has applied for a 40-year GIA; thus, if the project life is extended beyond 35 years, a supplemental NEPA analysis could be needed. At decommissioning, Project components would be recycled and disposed of in accordance with technologies and regulations applicable at the time of decommissioning. Decommissioning activities would be completed consistent with the requirements in Sections 3.5, 3.6.4, and 3.6.6 of the 2015 PEIS.

2.2 No Action Alternative

Under the No Action Alternative, WAPA would not proceed with the Interconnection Agreement. WAPA would not modify its facilities to accommodate the interconnection. For the purposes of impact analysis, the No Action Alternative assumes the CCWF2 Project would not be constructed.

3.0 Affected Environment and Environmental Consequences

Section 5 of the 2015 PEIS discusses the potential direct and indirect environmental impacts of wind energy development across the UGP Region and identified BMPs to minimize impacts. This chapter will focus on site-specific information relevant to this Project. First, the chapter will describe the existing conditions of various resources within the CCWF2 Project Area or otherwise specified area of analysis. Next, the chapter will analyze the anticipated impact of each alternative on the resource area. Where possible, impacts are categorized as direct or indirect, temporary or permanent, and by the significance of the impacts (i.e., negligible, minor, moderate, substantial). Lastly, the chapter will list any conservation measures that would be incorporated to reduce impacts.

As discussed in Section 2.1, the temporary construction activities would last an estimated 15-21 months, and decommissioning activities would last an estimated 12-15 months. Long-term, the Project would operate for approximately 35 years.

3.1 Soil, Paleontological, and Geologic Resources

This section analyzes potential impacts of the Project on soil, paleontology, and geology. The general analysis of these resources in Sections 4.2/5.2 and 4.8/5.8 of the 2015 PEIS are incorporated herein by reference. The Analysis Area for soil and geologic resources is the CCWF2 Project Area. The Project-specific affected environment and impacts are analyzed below.

The applicant is committed to implementing conservation measures for soil resources, derived from Section 5.2.3 of the 2015 PEIS, and is in accordance with easement stipulations, to minimize soil impacts associated with the Project (see Appendix A).

3.1.1 Affected Environment

3.1.1.1 Bedrock and Geologic Resources

Within the CCWF2 Project Area, bedrock geology is classified as sedimentary, clastic, with geologic resources, including clay or mud, sand, sandstone, shale, and silt (Figure 3.1-1; Martin et al. 2004). Sedimentary, clastic bedrock is created when pre-existing rock undergoes physical (i.e., wind, temperature, or water) or chemical weathering, is transported, and then becomes compacted and/or cemented (Brady and Weil 2004). As sedimentary, clastic bedrock weathers, a mosaic of soil horizons (i.e., layers) develops. Silt is the main geologic resource within the CCWF2 Project Area (Figure 3.1-1). Soils with high silt content are typically high in available nutrients for plants, making them ideal for farming (Brady and Weil 2004). Sedimentary, clastic bedrock is also considered a very stable soil when heavy in clay and silt, due to its characteristic of cementing within pores in the parent material (Haldar and Tisljar 2014). There are no known or mapped fault lines, active/abandoned oil and gas wells, or mining pits within the CCWF2 Project Area. The risk of geological hazards in the CCWF2 Project Area is considered low.

3.1.1.2 Paleontological Resources

Sections 4.8 and 5.8 of the 2015 PEIS state that the UGP Region has the potential to contain notable fossils, although fossils are rare. During the cretaceous period, the Rocky Mountains forming to the west pushed the land surface in South Dakota downward, inundating much of the state with the Western Interior Seaway (Everhart 2017). This seaway was inhabited by abundant invertebrates and vertebrate species. Adjacent to the sea, broad coastal plains provided for land-based species. Therefore, fossils could occur in the CCWF2 Project Area since fossils are found in sedimentary rock formations. However, the CCWF2 Project Area is unlikely to support important vertebrate fossils discussed in the 2015 PEIS.

Important vertebrate fossils, such as those of dinosaurs, are generally found in two areas of South Dakota: along the ridge that forms the outer boundary of the Black Hills, and in the counties of the northwestern corner of the state (Bjork and Tallman 1995). Generally, rock formations more likely to contain such fossils are not found within Campbell County (Bjork and Tallman 1995). Additionally, much of the soils within the CCWF2 Project Area are being farmed; therefore, earthmoving activities have likely already affected paleontological resources, if present.

3.1.1.3 Soils

The Project facilities and infrastructure are located on 70 different soil map units. Of these, the main soil type is Bryant silt loam, 2 to 6 percent slopes (Table 3.1-1, Figure 3.1-2).

Four soil types are considered prime farmland (approximately 611 ac) and 20 are farmland of statewide importance (approximately 4,398 ac; Table 3.1-1). These areas are protected under the Farmland Protection Policy Act (FPPA) of the Agriculture and Food Act of 1981 (HUD Exchange 2024). Four soil types are classified as hydric soils (approximately 462 ac; Table 3.1-1).

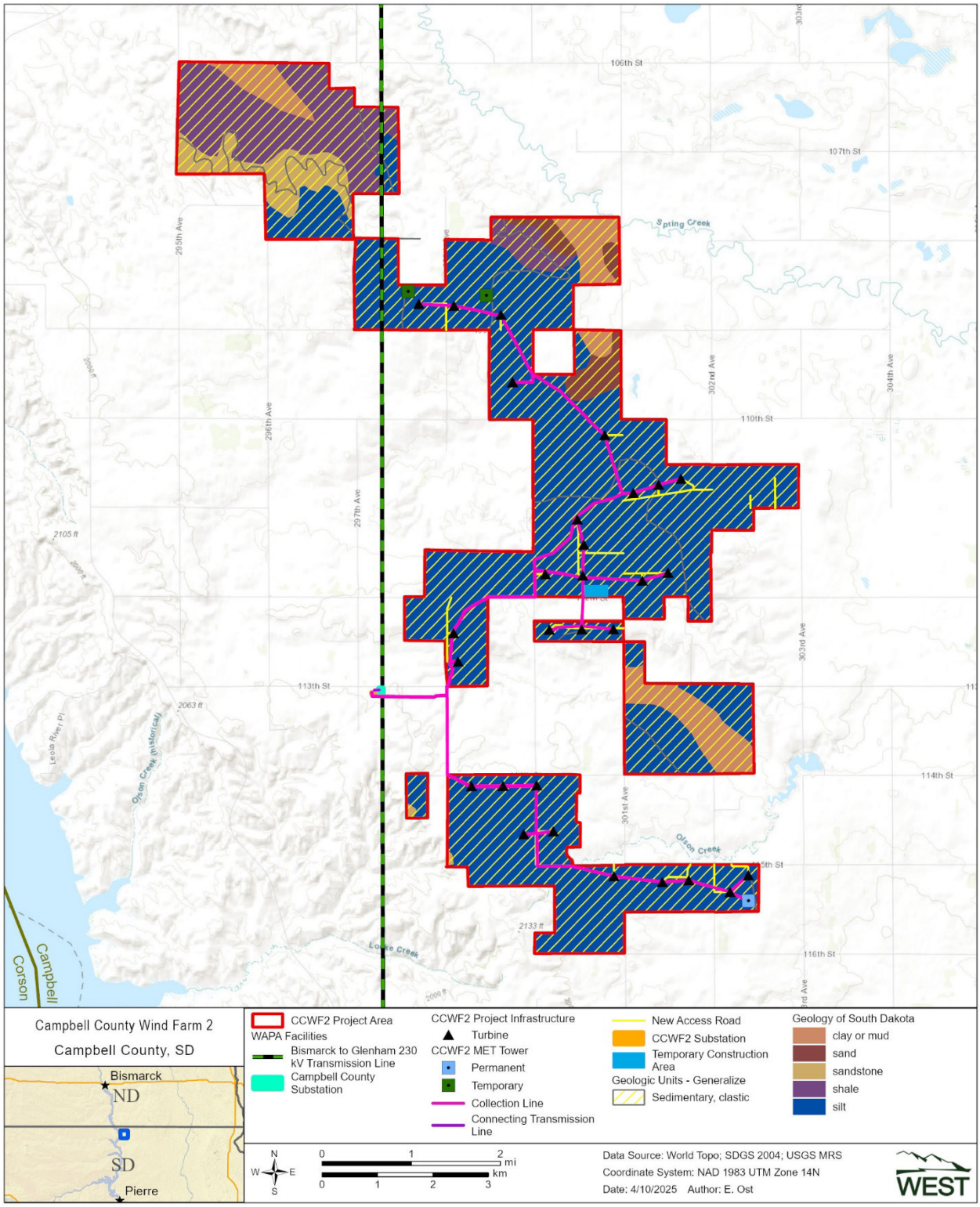

Figure 3.1-1 Bedrock and geologic resources within the CCWF2 Project Area.

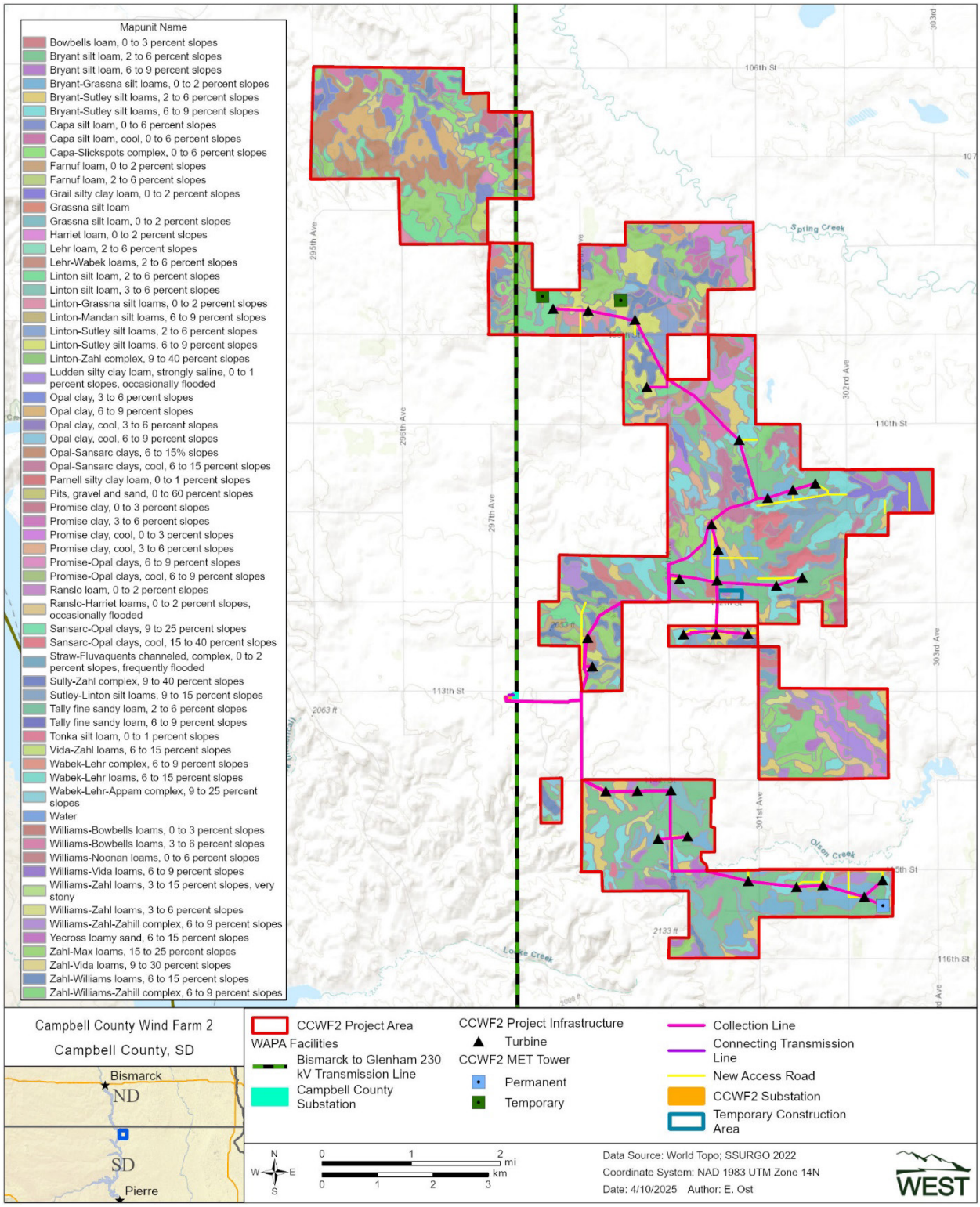

Figure 3.1-2 Soil resources within the CCWF2 Project Area.

Soils located within the CCWF2 Project Area are predominately not susceptible to erosion from wind. However, Yecross loamy sand, 6 to 15 percent slopes may be, with a Wind Erodibility Index (WEI) of 134 (WEI ranges from 0 to 310; Table 3.1-1). Four soil types are characterized as erodible by water, with K factors of 0.43 and 0.49 (K factor ranges from 0.02 to 0.64; Table 3.1-1). Soil K factor is a quantification of the susceptibility of soil erodibility or detachment by water. The erodibility factor predicts the long-term average soil loss resulting from sheet and rill erosion under various soil management practices. Soils that have high silt content are typically the most susceptible to water erosion, as particles easily detach from each other (U.S. Geological Survey [USGS] 2024c).

3.1.2 Environmental Consequences: Proposed Action Alternative

3.1.2.1 Bedrock and Geologic Resources

Bedrock would not be significantly impacted by the construction and operation of the Project. The bedrock is not considered shallow and will allow for construction of the Project (Martin et al. 2004). No important geologic resources occur in the CCWF2 Project Area; therefore, impacts would be negligible. Similarly, seismic, landslide, or other geological risks to or caused by Project development and operation are unlikely to occur.

3.1.2.2 Paleontological Resources

Should any fossils occur in the CCWF2 Project Area, they could be broken, crushed, or displaced, primarily during excavation for turbine footings, collection lines, and the proposed substation. Indirectly, increased erosion caused by construction activities may result in uncovering or movement of paleontological resources, although this is unlikely with proposed erosion control measures. Decommissioning impacts would be similar to those from Project construction. Cultivation and other farming activities have likely already damaged or displaced shallow marine fossils most likely to occur in the CCWF2 Project Area. Because the CCWF2 Project Area is not known for being a rich resource for important marine or vertebrate fossils, any Project impacts would be permanent but minor.

3.1.2.3 Soils

Section 5.2.1 of the 2015 PEIS discusses direct and indirect impacts to soil related to wind energy project construction, operations, maintenance, and decommissioning. The Project would affect soil during both construction and operation due to temporary soil disturbance and permanent facilities, respectively.

Approximately 413 ac of soil would be disturbed by the Project during construction activities. Most soil disturbance would be temporary during the construction of the Project. Grading and excavation would be carried out for construction of most Project components, exposing soils and bringing subsoils to the surface. Accordingly, the potential temporary impacts on the soil would include soil compaction, soil horizon mixing, sediment erosion by wind, water runoff, and vehicle usage, and possible soil layer contamination. Following construction, subsoil would be

decompacted where necessary and salvaged topsoil would be replaced. Soils would be returned to preconstruction land uses, which primarily involves crop cultivation. Non-cultivated areas would be stabilized with erosion controls, where needed, and revegetated. Impacts from construction activities would be expected to have a temporary, minor impact on soil resources.

Permanent aboveground facilities would permanently displace up to 28.5 ac of soil during operation of the Project. This includes the development of permanent aboveground facilities, including turbine pads, roads, and substation expansion.

Table 3.1-1. Soil units and characteristics within the CCWF2 Project Area.

Soil Unit Name	Area (acres)	Percent of CCWF2 Project Area	Hydric?	K Factor[a]	WEI[b]	Drainage Rating	Prime Farmland
Bowbells loam, 0 to 3 percent slopes	81	1	No	.28	48	Moderately well drained	All areas are prime farmland
Bryant-Grassna silt loams, 0 to 2 percent slopes	533	4	No	.37	48	Well drained	Prime farmland if irrigated
Bryant-Sutley silt loams, 2 to 6 percent slopes	470	4	No	.37	48	Well drained	Prime farmland if irrigated
Bryant-Sutley silt loams, 6 to 9 percent slopes	869	7	No	.37	48	Well drained	Farmland of statewide importance
Bryant silt loam, 2 to 6 percent slopes	1,777	15	No	.37	48	Well drained	Farmland of statewide importance
Bryant silt loam, 6 to 9 percent slopes	127	1	No	.37	48	Well drained	Farmland of statewide importance
Capa-Slickspots complex, 0 to 6 percent slopes	230	2	No	.49	86	Moderately well drained	Not prime farmland
Capa silt loam, 0 to 6 percent slopes	198	2	No	.49	48	Moderately well drained	Not prime farmland
Capa silt loam, cool, 0 to 6 percent slopes	37	0	No	.43	48	Moderately well drained	Not prime farmland
Farnuf loam, 0 to 2 percent slopes	64	1	No	.28	48	Well drained	Farmland of statewide importance
Farnuf loam, 2 to 6 percent slopes	35	0	No	.28	48	Well drained	Farmland of statewide importance
Grail silty clay loam, 0 to 2 percent slopes	159	1	No	.32	48	Moderately well drained	All areas are prime farmland
Grassna silt loam	16	0	No	.32	48	Moderately well drained	All areas are prime farmland
Grassna silt loam, 0 to 2 percent slopes	355	3	No	.32	48	Well drained	All areas are prime farmland
Harriet loam, 0 to 2 percent slopes	318	3	Yes	.37	48	Poorly drained	Not prime farmland
Lehr-Wabek loams, 2 to 6 percent slopes	11	0	No	.28	56	Somewhat excessively drained	Not prime farmland

Soil Unit Name	Area (acres)	Percent of CCWF2 Project Area	Hydric?	K Factor[a]	WEI[b]	Drainage Rating	Prime Farmland
Lehr loam, 2 to 6 percent slopes	3	0	No	.28	56	Somewhat excessively drained	Not prime farmland
Linton-Grassna silt loams, 0 to 2 percent slopes	102	1	No	.37	56	Well drained	Prime farmland if irrigated
Linton-Mandan silt loams, 6 to 9 percent slopes	85	1	No	.37	56	Well drained	Farmland of statewide importance
Linton-Sutley silt loams, 2 to 6 percent slopes	128	1	No	.37	56	Well drained	Prime farmland if irrigated
Linton-Sutley silt loams, 2 to 6 percent slopes	12	0	No	.37	56	Well drained	Prime farmland if irrigated
Linton-Sutley silt loams, 6 to 9 percent slopes	371	3	No	.37	56	Well drained	Farmland of statewide importance
Linton-Zahl complex, 9 to 40 percent slopes	32	0	No	.37	86	Well drained	Not prime farmland
Linton silt loam, 2 to 6 percent slopes	476	4	No	.37	56	Well drained	Prime farmland if irrigated
Linton silt loam, 3 to 6 percent slopes	23	0	No	.37	56	Well drained	Prime farmland if irrigated
Ludden silty clay loam, strongly saline, 0 to 1 percent slopes, occasionally flooded	113	1	Yes	.32	48	Poorly drained	Not prime farmland
Opal-Sansarc clays, 6 to 15 percent slopes	525	4	No	.37	86	Well drained	Not prime farmland
Opal-Sansarc clays, cool, 6 to 15 percent slopes	236	2	No	.37	86	Well drained	Not prime farmland
Opal clay, 3 to 6 percent slopes	78	1	No	.37	86	Well drained	Farmland of statewide importance
Opal clay, 6 to 9 percent slopes	289	2	No	.37	86	Well drained	Not prime farmland
Opal clay, cool, 3 to 6 percent slopes	19	0	No	.37	86	Well drained	Farmland of statewide importance
Opal clay, cool, 6 to 9 percent slopes	92	1	No	.37	86	Well drained	Not prime farmland
Parnell silty clay loam, 0 to 1 percent slopes	14	0	Yes	.24	48	Very poorly drained	Not prime farmland
Pits, gravel, and sand, 0 to 60 percent slopes	1	0	No	.02	56	Excessively drained	Not prime farmland
Promise-Opal clays, 6 to 9 percent slopes	34	0	No	.15	86	Well drained	Not prime farmland
Promise-Opal clays, cool, 6 to 9 percent slopes	5	0	No	.37	86	Well drained	Not prime farmland

Soil Unit Name	Area (acres)	Percent of CCWF2 Project Area	Hydric?	K Factor[a]	WEI[b]	Drainage Rating	Prime Farmland
Promise clay, 0 to 3 percent slopes	26	0	No	.37	86	Well drained	Farmland of statewide importance
Promise clay, 3 to 6 percent slopes	56	0	No	.37	86	Well drained	Farmland of statewide importance
Promise clay, cool, 0 to 3 percent slopes	22	0	No	.37	86	Well drained	Farmland of statewide importance
Promise clay, cool, 3 to 6 percent slopes	33	0	No	.37	86	Well drained	Farmland of statewide importance
Ranslo-Harriet loams, 0 to 2 percent slopes, occasionally flooded	141	1	No	.28	48	Somewhat poorly drained	Not prime farmland
Ranslo loam, 0 to 2 percent slopes	62	1	No	.28	48	Somewhat poorly drained	Not prime farmland
Sansarc-Opal clays, 9 to 25 percent slopes	70	1	No	.37	86	Well drained	Not prime farmland
Sansarc-Opal clays, cool, 15 to 40 percent slopes	186	2	No	.15	86	Well drained	Not prime farmland
Straw-Fluvaquents channeled, complex, 0 to 2 percent slopes, frequently flooded	55	0	No	.28	48	Well drained	Not prime farmland
Sully-Zahl complex, 9 to 40 percent slopes	12	0	No	.49	86	Well drained	Not prime farmland
Sutley-Linton silt loams, 9 to 15 percent slopes	4	0	No	.32	86	Well drained	Not prime farmland
Sutley-Linton silt loams, 9 to 15 percent slopes	267	2	No	.37	86	Well drained	Not prime farmland
Tally fine sandy loam, 2 to 6 percent slopes	42	0	No	.20	86	Well drained	Prime farmland if irrigated
Tally fine sandy loam, 6 to 9 percent slopes	4	0	No	.20	86	Well drained	Farmland of statewide importance
Tonka silt loam, 0 to 1 percent slopes	17	0	Yes	.32	48	Poorly drained	Not prime farmland
Vida-Zahl loams, 6 to 15 percent slopes	108	1	No	.24	48	Well drained	Not prime farmland
Wabek-Lehr-Appam complex, 9 to 25 percent slopes	47	0	No	.32	56	Excessively drained	Not prime farmland
Wabek-Lehr complex, 6 to 9 percent slopes	30	0	No	.17	48	Excessively drained	Not prime farmland
Wabek-Lehr loams, 6 to 15 percent slopes	6	0	No	.32	56	Excessively drained	Not prime farmland
Water	24	0	Not Rated	NA	NA	NA	Not prime farmland

Soil Unit Name	Area (acres)	Percent of CCWF2 Project Area	Hydric?	K Factor[a]	WEI[b]	Drainage Rating	Prime Farmland
Williams-Bowbells loams, 0 to 3 percent slopes	108	1	No	.24	48	Well drained	Farmland of statewide importance
Williams-Bowbells loams, 0 to 3 percent slopes	8	0	No	.24	48	Well drained	Prime farmland if irrigated
Williams-Bowbells loams, 3 to 6 percent slopes	158	1	No	.24	48	Well drained	Farmland of statewide importance
Williams-Bowbells loams, 3 to 6 percent slopes	65	1	No	.24	48	Well drained	Prime farmland if irrigated
Williams-Noonan loams, 0 to 6 percent slopes	120	1	No	.28	48	Well drained	Farmland of statewide importance
Williams-Vida loams, 6 to 9 percent slopes	11	0	No	.24	48	Well drained	Farmland of statewide importance
Williams-Zahl-Zahill complex, 6 to 9 percent slopes	365	3	No	.24	48	Well drained	Farmland of statewide importance
Williams-Zahl loams, 3 to 15 percent slopes, very stony	2	0	No	.24	48	Well drained	Not prime farmland
Williams-Zahl loams, 3 to 6 percent slopes	71	1	No	.24	48	Well drained	Farmland of statewide importance
Yecross loamy sand, 6 to 15 percent slopes	53	0	No	.10	134	Excessively drained	Not prime farmland
Zahl-Max loams, 15 to 25 percent slopes	914	8	No	.24	86	Well drained	Not prime farmland
Zahl-Vida loams, 9 to 30 percent slopes	61	1	No	.28	48	Well drained	Not prime farmland
Zahl-Williams-Zahill complex, 6 to 9 percent slopes	402	3	No	.24	86	Well drained	Not prime farmland
Zahl-Williams loams, 6 to 15 percent slopes	519	4	No	.24	86	Well drained	Not prime farmland
Totals[c]	**11,989**	**100**	**–**	–	–	–	–

Source: U.S. Department of Agriculture Natural Resources Conservation Service (2021).

a. K factor = indicates the susceptibility of a soil to sheet and rill erosion by water; 0.02 is the least and 0.64 is the most erodible.

b. WEI = Wind Erodibility Index; 0 is the lowest and 310 is the highest index value.

c. Totals may not equal the sum of the addends due to rounding.

The FPPA directs federal agencies to identify the quantity of farmland that would be converted by federal programs and take into account the adverse effects from farmland conversion, consider alternative actions, and ensure the federal program is compatible with state, county, and private programs and policies to protect farmland. Although prime farmland, prime farmland if irrigated, and farmland of statewide importance are present in the CCWF2 Project Area, coordination with the Natural Resources Conservation Service (NRCS) determined there would be no impacts to prime farmland (Appendix B).

Impacts to soil during operations would mainly entail periodic inspections and maintenance activities that would not increase the potential for soil erosion, surface runoff, or measurable sedimentation of nearby lakes, rivers, and streams. However, soil erosion could still occur along roads as surface runoff is channeled into natural drainages. Decommissioning impacts would be similar to construction impacts. Operations, maintenance, and decommissioning activities would have a permanent, minor impact on soil resources.

3.1.3 Environmental Consequences: No Action Alternative

The No Action Alternative would have no Project-related direct or indirect impacts on soils or geological resources. Impacts related to existing land uses, particularly agriculture, would continue to affect soils in the CCWF2 Project Area, such as through tilling and soil amendments, loss due to wind and water erosion, as well as soil disturbance and compaction from farm machinery and cattle.

3.2 Water Resources

This section analyzes potential impacts from the Project to surface waters, floodplains, and groundwater. The general analysis of these resources in Sections 4.3 and 5.3 of the 2015 PEIS are incorporated herein by reference. The Analysis Area for water resources is the CCWF2 Project Area. The Project-specific affected environment and impacts for water resources are analyzed below.

The applicant is committed to implementing conservation measures for water resources derived from Section 5.3.2 of the 2015 PEIS and according to easement stipulations, to minimize impacts to water resources associated with the Project (see Appendix A).

3.2.1 Affected Environment

Section 4.3.1 of the 2015 PEIS provides an overview of the White-Little Missouri drainage basin, which includes the CCWF2 Project Area.

Wetlands and waterbodies were identified for the Draft EA based on a desktop assessment, using data from the USFWS National Wetlands Inventory (NWI; 2024k) and USGS National Hydrography Dataset (NHD; 2024b), along with soils data, topographic information, climate data, and multiple years of aerial imagery to identify areas that are likely to exhibit wetland characteristics.

To refine and confirm the desktop information, CCWF2 conducted delineations in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (U.S. Army Corps of Engineers [USACE] 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (Version 2.0; USACE 2010). The delineation of water resources was conducted in Spring and Fall 2024, with a focus on areas where Project infrastructure may impact water resources. The wetland and waterbody delineation report presenting these findings can be found in Appendix C.

Under Section 404 of the Clean Water Act (CWA), a permit is required from the USACE for dredge or fill into Waters of the U.S. (WOTUS). Generally, WOTUS can include rivers, streams, creeks, and wetlands associated with them. The definition of WOTUS and those water resources under Section 404 jurisdiction is ultimately determined by the USACE as the regulatory authority. CCWF2 will comply with Section 404 of the CWA through the use of boring methods to avoid impacts to WOTUS, as well as Nationwide Permit 14 for one stream crossed by an access road.

Section 401 of the CWA requires states to review projects and federal permits to ensure they will not impact the stream quality or violate South Dakota Surface Water Quality Standards. Concurrent with Section 404 authorization with the USACE, CCWF2 would also seek to comply with the conditions outlined in the Statewide 401 Water Quality Certification for USACE 404 Nationwide Permits or seek individual 401 Water Quality Certification with the South Dakota Department of Agriculture and Natural Resources (SDDANR).

Section 311 of the CWA addresses the discharge, including accidental spills of oil and other hazardous substances into navigable and coastal waters. It requires facilities that may store over 1,320 gallons of oil, or that “have a reasonable expectation of an oil discharge to water” to develop a Spill Prevention, Control and Countermeasure (SPCC) Plan.

3.2.1.1 Surface Water (Rivers/Streams, Wetlands)

The CCWF2 Project Area overlaps two Level 8 Hydrologic Unit Codes, Upper Lake Oahe and Western Missouri Coteau. Surface water resources within the CCWF2 Project Area include 38.6 mi of intermittent streams and 0.3 mi of perennial Spring Creek (Table 3.2-1; Figure 3.2-1; USGS 2024b). Intermittent streams convey water seasonally, temporarily after precipitation events, or if adequately supported by local groundwater levels or springs. Perennial rivers convey water throughout the year (Levick et al. 2008). During low flow season (i.e., fall/winter), only sections of intermittent streams may experience surface water flows (Levick et al. 2008). Perennial rivers and intermittent streams typically support diverse riparian vegetation, creating important forage and cover habitat for a variety of wildlife species (Levick et al. 2008). Based on aerial imagery of the CCWF2 Project Area, several areas of intermittent streams support multiple structural levels of vegetation.

Numerous open water features (lake/pond) are located within the CCWF2 Project Area, amounting to approximately 30.5 ac (USGS 2024b). Like intermittent and perennial streams,

lakes/ponds and associated vegetation communities may provide structural and functional diversity important to wildlife.

Table 3.2-1. Miles of intermittent and perennial surface water within the CCWF2 Project Area.

National Hydrography Dataset Type	Miles
Intermittent	38.6
Perennial	0.3
Total:	**40.2**

Source: U.S. Geological Survey (2024b).

The USEPA coordinates with states to identify impaired waters under Section 303(d) of the CWA. The SDDANR establishes total maximum daily loads specific to the pollutants causing impairment within a waterbody (567 IAC 61). One 303(d) listed impaired water was identified in the CCWF2 Project Area: Spring Creek (SDDANR 2022). Spring Creek does not meet use criteria for dissolved oxygen, including limited contact recreation and warmwater fisheries.

No rivers are designated as part of the National Wild and Scenic Rivers System within the CCWF2 Project Area (National Park Service 2023). There are no Federal Emergency Management Agency (FEMA) designated floodplains within the CCWF2 Project Area (FEMA 2021).

According to the NWI, there are approximately 406 ac of wetlands mapped within the CCWF2 Project Area. The wetlands primarily consist of freshwater emergent wetlands, with freshwater ponds and riverine wetlands present to a lesser extent (Table 3.2-2). No NRCS or USFWS wetland easements were identified within the CCWF2 Project Area (USGS Gap Analysis Program 2022; National Conservation Easement Database 2024, USFWS NWI 2024k).

Table 3.2-2. U.S. Fish and Wildlife Service National Wetlands Inventory wetlands identified in the CCWF2 Project Area.

Wetland Type[a]	Area (Acres)	Percent of CCWF2 Project Area
Freshwater emergent	320.1	0.02
Freshwater pond	43.0	<0.01
Riverine	41.4	<0.01
Freshwater forested/shrub	1.6	<0.01
Totals[b]	**406.0**	**0.03**

[a] U.S. Fish and Wildlife Service National Wetlands Inventory (2024).

[b] Totals may not equal the sum of the addends due to rounding.

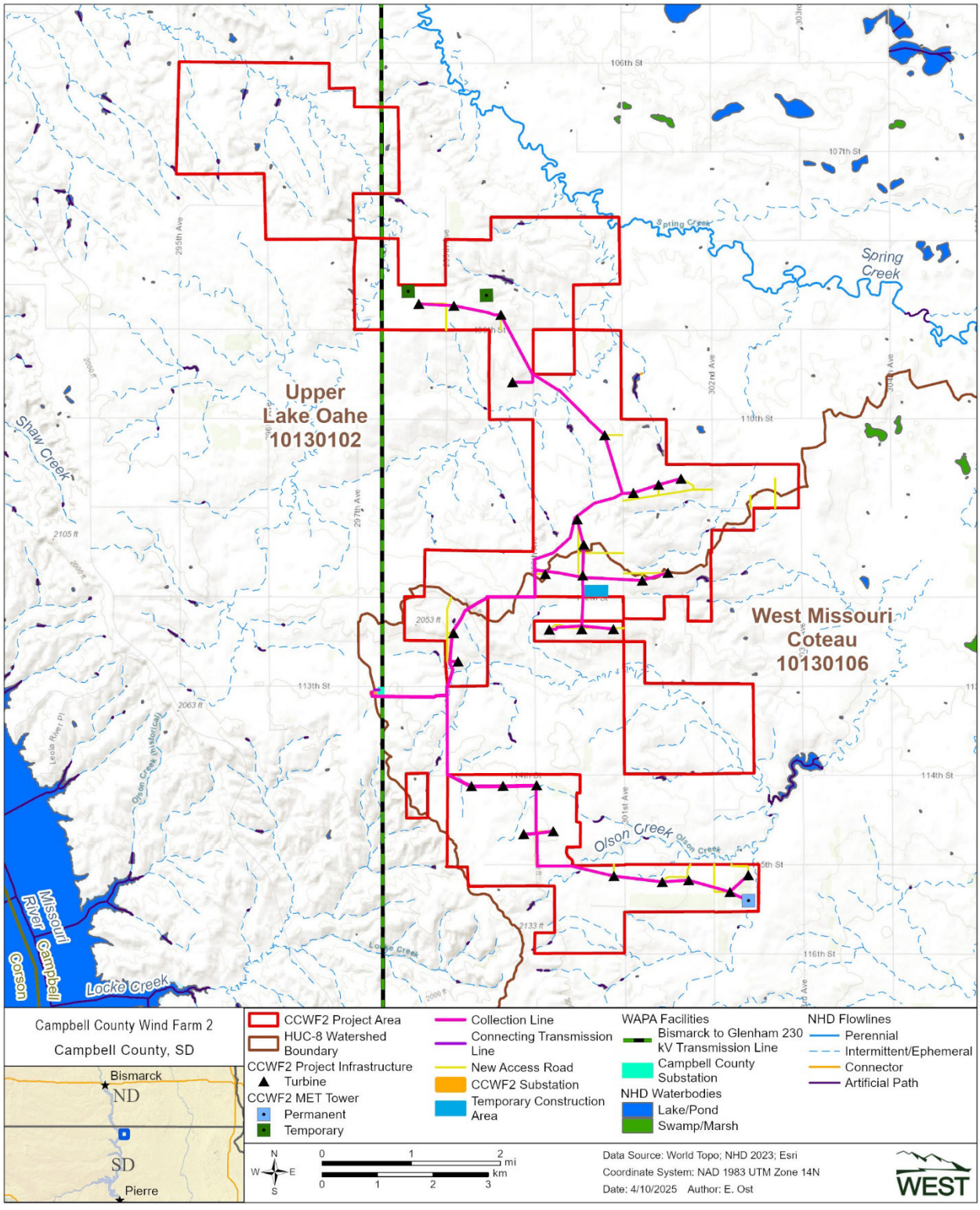

Figure 3.2-1 Surface water resources within the CCWF2 Project Area.

3.2.1.2 Groundwater (Aquifers)

The Northern Great Plains aquifer underlays the CCWF2 Project Area and is considered nationally important, as it has supported major agricultural operations and drinking water since 1940 (Peterson et al. 2020). In 2012, the total withdrawals from the aquifer for agricultural irrigation, public drinking supply, and other uses were the largest of any North American aquifer, totaling approximately $50 billion dollars in value (Peterson et al. 2020).

Available groundwater within the Northern Great Plains aquifer is predicted to decline with increased anthropogenic needs over the next 50 years (Peterson et al. 2020). Groundwater withdrawals for irrigation have been the single largest anthropogenic effect on the groundwater-flow system of the Northern High Plains aquifer and represent the largest outflow of available groundwater from the system. Groundwater supply modeling of the aquifer, conducted by Peterson et al. (2020), anticipates that even in normal precipitation and aquifer recharge years, withdrawals for irrigation and other consumptive uses will result in declines in overall water availability within the aquifer.

3.2.2 Environmental Consequences: Proposed Action Alternative

A preliminary assessment of impacts based on NWI and NHD data were presented in the Draft EA. A final assessment based on the field delineations completed in May and October of 2024 is provided below.

3.2.2.1 Surface Water (Rivers/Streams, Wetlands)

Section 5.3.1 of the 2015 PEIS describes common impacts on surface water resources due to wind energy development. Common impacts include the use of water resources, potential degradation of water quality, and potential alteration to natural flows.

Project components have been located generally in upland areas, mostly avoiding low-lying wetlands and streams. Construction activities would impact up to 154 feet of one intermittent stream at a single collection line and access road crossing. The primary construction impacts at this crossing would be to water quality from sedimentation due to excavation, trenching, and grading near these areas. To comply with CWA Sections 404 and 401, CCWF2 would comply with all general, specific, regional, and water quality certification conditions in the State of South Dakota under Nationwide Permit 14 (NWP 14; Linear Transportation Projects).

Based on the 2024 field delineations, there are four other locations in which streams would be crossed by a collection line route, however, impacts at these crossings would be avoided through boring the collection line underneath the stream, rather than use of an open trench to install the collection line.

Project facilities have been sited away from Spring Creek and, therefore, no direct impacts to 303(d) impaired waters are expected.

Based on the 2024 field delineations, there are four locations in which freshwater emergent wetlands would be crossed by a collection line route, however, impacts at these crossings would be avoided through boring the collection line underneath the wetland, rather than use of an open trench to install the collection line.

Table 3.2-3 summarizes the potential impacts to wetlands and waterbodies below. Figure 3.2-2 shows the location of all field delineated wetlands and waterbodies. Relative to the abundance of wetlands and waterbodies in the surrounding area, the temporary impacts due to Project operation are negligible on local and landscape scales.

Table 3.2-3. Potential impacts to wetlands and waterbodies.

Feature ID	Feature Type	Project component(s)	Crossing Method	Construction (Temporary) Impacts (acres)	Operational (Permanent) Impacts (acres)
s-gr-01	Intermittent Stream	Access Road and Collection Line	Bore (Collection Line), Culverted Road Crossing	<0.01	<0.01
s-gr-02	Intermittent Stream	Collection Line	Bore	N/A	N/A
s-gr-04	Intermittent Stream	Collection Line	Bore	N/A	N/A
s-gr-05	Intermittent Stream	Collection Line	Bore	N/A	N/A
s-gr-06	Intermittent Stream	Collection Line	Bore	N/A	N/A
w-gr-01	Wetland	Collection Line	Bore	N/A	N/A
w-rc-03	Wetland	Collection Line	Bore	N/A	N/A
w-rc-04	Wetland	Collection Line	Bore	N/A	N/A
w-rc-05	Wetland	Collection Line	Bore	N/A	N/A

Source: Cook et al. (Appendix C; 2024).

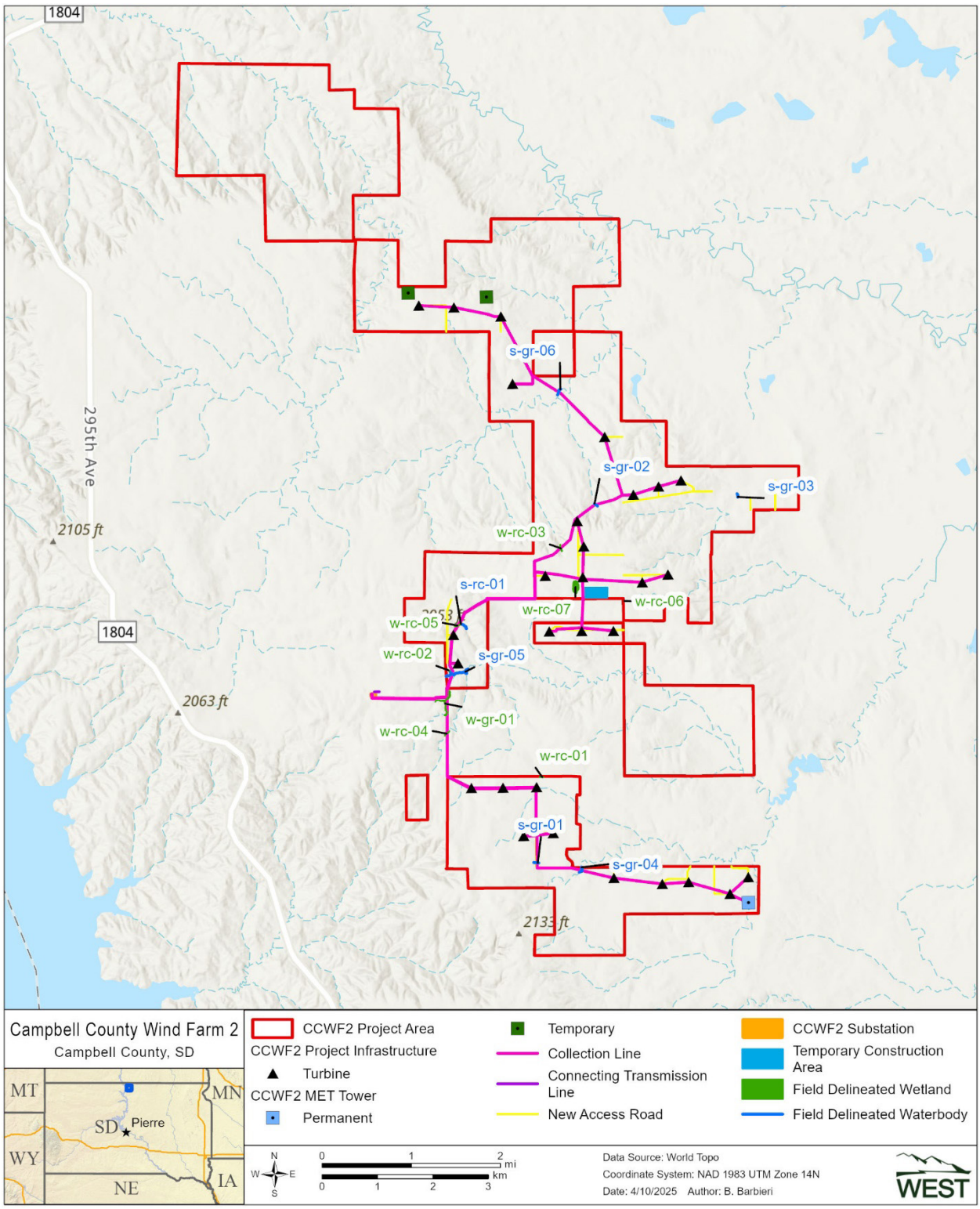

Figure 3.2-2 Field-delineated water resources within the CCWF2 Project Area.

In seeking authorization for a single crossing under NWP 14, and the avoidance of the majority of water resource crossings through use of the bore methods, impacts to surface waters are expected to be minor. NWP 14 requires the crossing to comply with Sections 401, 402 and 404 of the Clean Water Act, among other laws. Potential adverse impacts and compliance with these laws are controlled by the terms and conditions NWP 14, regional and case-specific conditions, and the environmental review process that is undertaken prior to the issuance of NWPs. Adherence to these conditions by the CCWF2, in particular Section 401 water quality certification conditions for NWPs as established by the State of South Dakota, are expected to avoid or minimize impacts to water quality, including the potential for indirect effects to 303(d) impaired Spring Creek.

Disturbance and grading associated with construction of the project has the potential to expose large areas of soil and the potential for erosion, mass wasting on slopes, and sedimentation into surface water resources adjacent and crossed by Project infrastructure. A general permit for storm water discharges from the SDDANR would also be obtained for construction activities, and construction practices required under the permit would likely reduce impacts from these activities. Compliance under the general permit requires development of a SWPPP, which includes best management practices to reduce the potential for erosion and sedimentation into surface waters, as well as regular inspection of the site to ensure compliance. With the proper implementation of these measures, erosion, mass wasting, and sedimentation impacts to water resources would be minimal and in compliance with the CWA.

Once construction is complete, temporary structures would be removed and the original grade and drainage pattern would be re-established to the extent practicable, depending on permit conditions, as well as landowner and county agreements. By minimizing the affected area and through proper design and maintenance, it is anticipated Project components would have minor, temporary and permanent impacts. Decommissioning impacts on surface waters would be similar to those during construction.

3.2.2.2 Groundwater (Aquifers)

Impacts to groundwater by the Project include potential changes in runoff patterns and volume of runoff. These impacts would likely be negligible compared to the overall volume of water reaching the Northern High Plains aquifer. Surface disturbance anticipated by the Project represents < 0.1% of the overall surface area (≈ 93,000 square mi) that provides groundwater recharge to the Northern High Plains aquifer (Peterson et al. 2020).

3.2.3 Environmental Consequences: No Action Alternative

The No Action Alternative would have no Project-related direct or indirect impacts on water resources. Existing land uses, particularly agriculture, would likely continue. Agricultural activities can affect water resources by removing or altering vegetation, which can increase erosion and sedimentation, as well as introducing pollutants from agricultural operations (e.g., fertilizer, hormones, pesticides, and animal waste) into surface waters.

3.3 Vegetation and Land Cover

This section analyzes potential impacts of the Project to vegetation and land cover. The general analysis of these resources in Sections 4.1/5.1 and 4.6.1/5.6.1.1 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for vegetation and land cover is the CCWF2 Project Area. The Project-specific affected environment and impacts for vegetation and land cover are analyzed below.

CCWF2 is committed to implementing conservation measures for vegetation resources derived from Section 5.1.2 of the 2015 PEIS and in accordance with landowner agreements, to minimize vegetation impacts associated with the Project (see Appendix A).

3.3.1 Affected Environment

3.3.1.1 Land Cover

Existing land cover in South Dakota is addressed in Section 4.1.1 of the 2015 PEIS and upland plant communities are described in Section 4.6.1.1 of the 2015 PEIS. Vegetation specific to the Project is described below, including general vegetation types, untilled grassland and grassland easements, and noxious weeds.

Table 3.3-1 provides acreages of land cover within the CCWF2 Project Area. According to the National Land Cover Database (NLCD; 2021), the Analysis Area is dominated by herbaceous and cultivated crops, with 52.4% (6,281 ac) and 41.7% (5,001 ac) coverage, respectively (Table 3.3-1). The NLCD defines herbaceous as areas mainly composed of (≥ 80% of total vegetation) grasses or non-woody vegetation. These areas are not subject to intensive management, such as tilling, but may be grazed. Forests and woodland areas are not prevalent in the CCWF2 Project Area and are limited to ≈ 7 acres.

Table 3.3-1. Land cover types within the CCWF2 Project Area.

Land Cover Type [a]	Area (acres)	Percent of CCWF2 Project Area
Herbaceous	6,281	52.4
Cultivated Crops	5,001	41.7
Developed	261	2.2
Hay/Pasture	227	1.9
Emergent Herbaceous Wetlands	203	0.4
Open Water	9	0.1
Deciduous forest	6	<0.1
Woody wetlands	1	<0.1
Totals[b]	**11,989**	**100**

[a] National Land Cover Database (2021).

[b] Totals may not equal the sum of the addends due to rounding.

3.3.1.2 Grasslands

The CCWF2 Project Area is within two Level IV ecoregions, the Southern Missouri Coteau Slope, and the Missouri Coteau Slope (USEPA 2012). These ecoregions, historically composed of grasslands, have been largely converted for agricultural use (e.g., row crops and livestock grazing; USEPA 2012) and include some wetland and riparian areas.

Native grasslands are of high conservation value in South Dakota, with significant losses in the state due to conversion to agricultural and development purposes (Bauman et al. 2016). A grassland habitat assessment was completed to classify sod types of grasslands as either broken or unbroken (Appendix D). Broken sod includes grasslands that have been mechanically manipulated historically (Bauman et al. 2018). Unbroken sod includes all undisturbed grasslands or native prairies. Results of the habitat assessment indicated ≈ 47% of the CCWF2 Project Area is composed of grasslands, with 5,108 ac of unbroken sod and 508 ac of broken sod (Table 3.3-2).

Table 3.3-2. Grassland sod types within the CCWF2 Project Area.

Sod Type	Acres	Percent of Total Grassland	Percent of CCWF2 Project Area
unbroken sod	5,108	91.0	42.6
broken sod	508	9.0	4.3
Total[a]	**5,616**	**100**	**46.9**

[a] Totals may not equal values shown due to number rounding.

3.3.1.3 Conservation Easements

WAPA has coordinated with the USFWS Sand Lake Wetland Management District and has determined no USFWS easements are present in the CCWF2 Project Area (see Appendix B). Also, no Farm Service Agency (FSA) easements are in the CCWF2 Project Area.

3.3.1.4 Noxious Weeds

Noxious weeds are defined by South Dakota Codified Law (SDCL) 38-22 as any plant which the South Dakota Weed and Pest Commission (Commission) has found to be detrimental to the production of crops or livestock or to the welfare of persons residing in the state. Noxious weeds and other invasive plant species can pose serious threats to agricultural productivity. The Commission regulates noxious weeds through the administration of the State Weed and Pest Program, which established a list of designated noxious weeds. Designations are reviewed annually; however, the commission may make emergency designations as warranted. The Commission can also make designation of locally noxious weeds, limited to a total of eight per county and to a renewable five-year period (Table 3.3-3). The Commission, and associated county weed and pest boards, encourages voluntary compliance with the provisions of the state weed and pest statute and regulations. Protective operations and remedial actions, as allowed by SDCL 38-22, are only taken by the Commission when voluntary compliance is not attainable within a reasonable length of time.

Table 3.3-3. State and locally designated noxious weeds in Campbell County.

State Noxious Weeds	Local Noxious Weeds with Reported Infestations in Campbell County
absinth wormwood (*Artemisia absinthium*)	field bindweed (*Convolvulus arvensis*)
Canada thistle (*Cirsium arvense*)	musk thistle (*Carduus nutans*)
leafy spurge (*Euphorbia esula*)	yellow toadflax (*Linaria vulgaris*)
perennial sow thistle (*Sonchus arvensis*)	
hoary cress (*Cardaria draba*)	
purple loosestrife (*Lythrum salicaria*)	
saltcedar (*Tamarix aphylla, T. chinensis, T. gallica, T. parviflora and T. ramosissima*)	

3.3.2 Environmental Consequences: Proposed Action Alternative

3.3.2.1 Land Cover

The Project would affect up to 282 ac of cropland, 103 ac of herbaceous vegetation, 21 ac of developed land, and 7 ac of hay/pasture cover types during construction and operation (Table 3.3-4). No forested land cover impacts are expected; however, a minimal number of individual trees in specific circumstances may need removal. These estimates are the maximum extent of disturbance if all final and alternate turbines under consideration were to be built.

Table 3.3-4. Land cover types potentially impacted by the Project.

Land Cover Type [a]	Temporary Impacts during Construction (acres)	Percent of Temporary Impacts	Permanent Impacts during Operation (acres)	Percent of Permanent Impacts
Cultivated Crops	282	68%	19	66%
Herbaceous	103	25%	7	24%
Developed	21	5%	2	7%
Hay/Pasture	7	2%	<1	3%
Barren Land	<1	<0.1%	0	0
Emergent Herbaceous Wetland	<0.1	0.01%	0	0
Totals[b]	**413**	**100%**	**29**	**100%**

[a] National Land Cover Database (2021).

[b] Totals may not equal the sum of the addends due to rounding.

Impacts to land cover and general vegetation by the Project would be similar to those described in Section 5.1.1 of the 2015 PEIS. Construction impacts would be short-term, lasting the duration of construction (or about one growing season), and the additional time it takes for restoration of disturbed areas (typically a minimum of two years). CCWF2 has minimized vegetation impacts by collocating Project components where feasible. Following construction, temporary construction areas would be returned to pre-construction land uses. Non-cultivated areas would be reseeded to herbaceous vegetation. Crops would be temporarily affected but

would be re-established by the next growing season. Other herbaceous plant communities would likely experience short-term impacts, with recovery within two to three years. Overall, anticipated direct vegetation impacts would be minor.

Beyond the permanent conversion of land to developed uses, operation of the Project would not result in additional impacts during operation. Activities during operation and maintenance would be restricted to developed, unvegetated areas, such as turbine pads, permanent access roads, a substation, and an O&M building.

During construction, indirect, short-term to permanent degradation to plant communities and crops could occur due to surface disturbance, traffic, and revegetation activities that could introduce and/or spread noxious weeds. If uncontrolled, noxious weeds could lead to a general reduction in vegetative condition throughout the Project and surrounding area and could degrade conditions for agriculture and wildlife. Conservation measures listed in Appendix A, such as vehicle washing, would minimize the introduction of noxious weeds, and others, such as a control plan and monitoring, would minimize the spread of noxious weeds.

Operation of the Project is unlikely to result in the introduction or spread of noxious weeds, although vehicle traffic associated with maintenance activities could transport weed seeds along access roads. Decommissioning impacts would be similar to construction impacts.

3.3.2.2 Grasslands

Project construction would temporarily disturb ≈ 48.4 ac of grasslands, ≈ 33.9 ac of which is native, unbroken grassland (unbroken sod), by crushing or trampling from vehicles, equipment, and workers. Project operation would affect ≈ 2.2 ac of grasslands, ≈ 1.0 ac of which is unbroken grassland, long-term due to conversion of existing vegetation into developed facilities. Long-term impacts to unbroken grasslands comprise ≈ 3% of the Project's permanent acreage impacts. As recommended by South Dakota Game, Fish and Parks (SDGFP), no turbines would be constructed in native, unbroken grasslands.

3.3.3 Environmental Consequences: No Action Alternative

No Project-related impacts to vegetation resources would occur, but ongoing impacts, such as conversion of herbaceous land cover to cropland, would continue at existing rates.

3.4 Wildlife

This section analyzes potential impacts from the Project to wildlife, including species that are common, rare, or classified as state Species of Greatest Conservation Need (SGCN). The general analysis of these resources in Sections 4.6 and 5.6 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for wildlife is the CCWF2 Project Area. The Project-specific affected environment and impacts to wildlife are analyzed below.

CCWF2 is committed to implementing the conservation measures for wildlife resources derived from Section 5.6.2 of the 2015 PEIS, to minimize wildlife impacts associated with the Project. A list of these measures can be found in Appendix A.

3.4.1 Affected Environment

CCWF2 has carried out wildlife studies in accordance with the recommendations in the 2012 USFWS *Land-Based Wind Energy Guidelines* (WEG). These studies have accomplished the third, *Field Studies to Document Site Wildlife and Habitat and Predict Project Impacts*, of five tiers of site characterization studies. These studies are listed in Table 3.4-1 and are included in Appendix D, wherein details regarding study areas and methodologies can be found. Due to changes in the proposed layout, some species-specific surveys were conducted in areas not currently within the current CCWF2 Project Area. However, these survey results provide a baseline for wildlife conditions in the CCWF2 Project Area and are discussed in the context of supplemental public data sources and pertinent literature results in the subsections below. CCWF2 has also prepared a Wildlife Conservation Strategy, as recommended under the Wind Energy Guidelines, to provide a written record of efforts to characterize avian and bat resources within the Project Area, assess potential impacts to avian and bat resources, and to document conservation measures that have been or will be taken to avoid, minimize, and/or mitigate for those potential impacts (Appendix E). Analysis areas for covered wildlife groups vary based on species-specific protocols and life history requirements and are specified in their respective subsections.

Table 3.4-1. Summary of wildlife studies conducted at the Project.

Study Type	Survey Dates	Reference
Avian Use Survey	June 21, 2020 – May 19, 2021	Piorkowski and Agudelo 2021b
Avian Use Survey	March 2023 – February 2024	Piorkowski and Chouinard 2024
Whooping Crane Stopover Habitat Assessment[a]	March 2023	See Appendix G
Prairie Grouse Lek Survey	April 4–29, 2021	Piorkowski and Agudelo 2021a
Prairie Grouse Lek Survey	March 27 – May 2, 2023	Piorkowski and Gerringer 2023
Prairie Dog Survey	April 2021	Piorkowski 2021c
Raptor Nest Survey	March 29–31; May 10–11, 2021	Piorkowski 2021a
Raptor Nest Survey	March 12 – July 8, 2023	Piorkowski and Wilson 2023
Bat Acoustic Survey	August 5 – October 23, 2019; April 17 – June 25, 2020	Burns & McDonnell Engineering Company Inc. 2020
Northern Long-eared Bat Summer Habitat Assessment	Not Applicable	Piorkowski 2021b
Northern Long-eared Bat Presence/Probable Absence Surveys	July 31 – August 9, 2023	Sirajuddin and Piorkowski 2023

[a] Assessment to determine suitable whooping crane stopover habitat conducted to inform the Whooping Crane consistency evaluation for the Project. See Appendix G for additional detail.

3.4.1.1 General Wildlife

Wildlife is addressed in Section 4.6.2 of the 2015 PEIS, including herpetofauna, birds, and mammals in the UGP Region. The CCWF2 Project Area falls in the Northwestern Glaciated Plains Level III Ecoregion (USEPA 2013). Common wildlife species in this ecoregion, outside of the taxa groups discussed below, include white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), pronghorn (*Antilocapra americana*), white-tailed jackrabbit (*Lepus townsendii*), white-tailed prairie dogs (*Cynomys leucurus*), and bobcat (*Lynx rufus*). Common herpetofauna species include snapping turtle (*Chelydra serpentina*), spiny softshell turtle (*Apalone spinifera*), smooth green snake (*Opheodrys vernalis*), and prairie rattlesnake (*Crotalus viridis*; McNab 1996). Invertebrates in the ecoregion include species commonly associated with prairies and agricultural lands. Wildlife may use agricultural lands for foraging and shelter, along with herbaceous vegetation in field edges and swales. Wooded areas or shelterbelts, riparian areas, and wetland/waterbody habitats may also be used by general wildlife species (see Section 3.2).

3.4.1.2 Birds

The CCWF2 Project Area is within the Prairie Potholes Bird Conservation Region 11 (U.S. North American Bird Conservation Initiative 2021) and two Level IV ecoregions, the Southern Missouri Coteau Slope, and the Missouri Coteau Slope (USEPA 2012). These ecoregions, historically composed of grasslands, have been largely converted for agricultural use (USEPA 2012) and include some wetland and riparian areas. No National Audubon Society Important Bird Areas were identified in the CCWF2 Project Area. The CCWF2 Project Area is located in the Central Flyway, which contains the routes of migrating birds through the region (USFWS 2024a). Birds in the CCWF2 Project Area mainly include species associated with the Northern Great Plains and areas with open, disturbed agricultural habitat with seasonal migrants, including waterfowl, waterbirds, and shorebirds.

A total of 7,653 bird observations were made across all avian use (AU) surveys (Appendix D), consisting of 75 unique species. Groups with the greatest representation included waterfowl (88.0%), passerines (5.7%), and doves/pigeons (0.8%). Small bird surveys were conducted in the first year of AU surveys, with a total of 26 unique small bird species observed during the survey period. The three most observed small bird species included red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), and horned lark (*Eremophila alpestris*; Piorkowski and Agudelo 2021b).

The Migratory Bird Treaty Act of 1918 is the cornerstone regulatory act of migratory bird conservation and protection, including prohibiting the take of migratory bird species. The USFWS has furthered these conservation efforts by identifying Birds of Conservation Concern (BCC; USFWS 2021a) that are at a greater risk of becoming candidate species under the ESA and are a high conservation priority. Five BCC species were recorded during AU surveys at the Project, including Franklin's gull (*Leucophaeus pipixcan*), northern harrier (*Circus hudsonius*), bobolink (*Dolichonyx oryzivorus*), grasshopper sparrow (*Ammodramus savannarum*), and red-headed woodpecker (*Melanerpes erythrocephalus*; Table 3.4-2; Piorkowski and Agudelo 2021b, Piorkowski and Chouinard 2024; Appendix D). The USFWS Information for Planning and

Consultation (IPaC) report for the Project (USFWS 2024b, 2025) also listed black tern (*Chlidonias niger*), marbled godwit (*Limosa fedoa*), and western grebe (*Aechmophorus occidentalis*) as BCC species with potential breeding populations on site.

Certain bird species that are likely to be impacted by separating their habitats into smaller blocks, thus reducing connectivity (i.e., habitat fragmentation), are identified in *South Dakota Species of Habitat Fragmentation Concern: Grassland Birds* (Bakker 2020). During AU surveys, six of these species were observed: sharp-tailed grouse (*Tympanuchus phasianellus)*, northern harrier, upland sandpiper (*Bartramia longicauda*), clay-colored sparrow (*Spizella pallida)*, grasshopper sparrow (*Ammodramus savannarum)*, and western meadowlark (*Sturnella neglecta*; Appendix D)

In 2015, South Dakota Game, Fish and Parks drafted a state Wildlife Action Plan to assess the health of South Dakota's fish and wildlife and associated habitats (SDGFP 2023). This plan includes endangered and threatened species, SGCN, species regionally or globally imperiled for which South Dakota represents an important portion of their remaining range, and species with characteristics making them vulnerable. Eleven SGCN were observed during the Project's AU surveys, including American kestrel (*Falco sparverius*), ferruginous hawk (*Buteo regalis*), Franklin's gull (*Leucophaeus pipixan*), peregrine falcon (*Falco peregrinus*), upland sandpiper (*Bartramia longicauda*), bobolink (*Dolichonyx oryzivorus*), grasshopper sparrow (*Ammodramus savannarum*), horned lark (*Eremophila alpestris*), and red-headed woodpecker (*Melanerpes erythrocephalus*; SDGFP 2024c; Table 3.4-2). Three bald eagles (*Haliaeetus leucocephalus*) and one golden eagle (*Aquila chrysaetos*), also SGCN, were recorded incidentally (i.e., outside of AU point-count surveys) at the Project (Table 3.4-2). These observations are discussed in further detail in Section 3.4.1.4.

As recommended in the WEG, CCWF2 is developing a Project-specific WCS. The WCS will identify wildlife species at risk from mortality resulting from covered activities and establishes BMPs to be implemented by the Project to minimize impacts to these species.

Table 3.4-2. Summary of selected species observations during avian use surveys and incidentally at the Project by survey year.

			Year One Surveys		Year Two Surveys[b]		Average # Obs/Yr
Species	Scientific Name	Status[a]	# obs	incidental	# obs	incidental	# obs
American kestrel	*Falco sparveris*	SGCN	0	0	1	0	0.5
bald eagle	*Haliaeetus leucocephalus*	SGCN; BGEPA	0	2	0	1	0
golden eagle	*Aquila chrysaetos*	SGCN; BGEPA	0	0	0	1	0
ferruginous hawk	*Buteo regalis*	SGCN	1	0	0	0	0.5
Franklin's gull	*Leucophaeus pipixcan*	SGCN; BCC	21	0	21	0	21
peregrine falcon	*Falco peregrinus*	ST; SGCN	1	0	0	0	0.5
northern harrier	*Circus hudsonius*	BCC	9	0	5	0	7
upland sandpiper	*Bartramia longicauda*	SGCN	7	0	11	0	9
bobolink	*Dolichonyx oryzivorus*	BCC; SGCN	2	0	–	–	2

Species	Scientific Name	Status[a]	Year One Surveys		Year Two Surveys[b]		Average # Obs/Yr
			# obs	incidental	# obs	incidental	# obs
grasshopper sparrow	*Ammodramus savannarum*	BCC; SGCN	4	0	–	–	4
horned lark	*Eremophila alpestris*	SGCN	53	0	–	–	53
red-headed woodpecker	*Melanerpes erythrocephalus*	BCC; SGCN	3	1	–	–	3

a. ST = State Threatened; SGCN = Species of Greatest Conservation Need; BGEPA = Bald and Golden Eagle Protection Act of 1940; BCC = Birds of Conservation Concern. Sources: BGEPA 1940; South Dakota Game, Fish and Parks, 2014, 2018, 2024b, 2024c; U.S. Fish and Wildlife Service 2021c, 2024b, 2025.

b. Year two surveys did not include avian use surveys for small birds.

3.4.1.3 Prairie Grouse

The CCWF2 Project Area is in the occupied range of the greater prairie-chicken (*Tympanuchus cupido*) and sharp-tailed grouse (collectively "prairie grouse"). Prairie grouse were once widespread in South Dakota but have declined in distribution and abundance due to loss and fragmentation of grassland habitat (SDGFP 2022). Historically, sharp-tailed grouse occurred throughout South Dakota, but have since been extirpated from the south-east portion of the state (Runia and Solem 2018). Greater prairie-chickens occur in the northeast part of the state, but the densest and most stable populations are in the center of the state and south to Nebraska (Runia et al. 2021). Greater prairie-chickens are a SGCN in South Dakota and both species are considered game species important to state hunting and recreational resources (SDGFP 2022). Prairie grouse are obligate grassland species, preferring large heterogenous swaths of intact prairies in which they can forage and find adequate shelter (SDGFP 2022).

Lek surveys were conducted to document prairie grouse leks during the breeding season (late March to early May) in the CCWF2 Project Area and a 2-mi buffer (collectively, the Analysis Area) in 2021 and 2023 (see Appendix D for survey methodology). All leks were sharp-tailed grouse leks. Of the four leks surveyed, four leks were found to be active during the 2021 survey period, while only one lek remained active during the 2023 survey period (Table 3.4-3). Of the four 2021 leks, only one was located in the CCWF2 Project Area and was not active in 2023.

Table 3.4-3. Summary of prairie grouse leks in the CCWF2 Project Area by survey year.

Lek ID	2021			2023		
	Species	Maximum Number of Grouse	Status	Species	Maximum Number of Grouse	Status
1[a]	STGR	12	Active	–	0	Inactive
2	STGR	13	Active	STGR	3	Active
3	STGR	7	Active	–	0	Inactive
4	STGR	7	Active	–	0	Inactive

a. Located within the CCWF2 Project Area.

Species: STGR = sharp-tailed grouse.

3.4.1.4 Eagle and Other Raptors

The Bald and Golden Eagle Protection Act of 1940 provides federal protection to bald and golden eagles, prohibiting the taking or otherwise harming of eagles, their nests, or their eggs. Ground and aerial raptor nest surveys were conducted in 2021 and 2023, respectively, to gather information on eagle nest locations and nests of other raptor species in the Analysis Area. A cumulative 29 unique nests were identified across survey years in the Analysis Area. To date, no golden eagle nests have been observed within the Analysis Area. One bald eagle nest was observed in both years of raptor nest surveys in the Analysis Area but was not within the CCWF2 Project Area. This nest was observed as occupied and active during both survey periods and was located near the eastern edge of the Analysis Area, 2.17 mi away from the nearest proposed turbine location (Appendix D).

No bald or golden eagles were observed during the AU surveys; however, three bald eagles and one golden eagle were observed incidentally at the Project (Table 3.4-2; Appendix D). These incidental observations were recorded in the southern portion of the CCWF2 Project Area during the winter months. Data presented by eBird (2007 to 2021) indicates the Analysis Area is in an area of generally low abundance of bald eagles with no clear areas of concentration, outside of river corridors located to the west of the CCWF2 Project Area (Figure 3.4-2). The same bald eagles may be seen throughout the year as they have been observed nesting within the region and have the potential to migrate or winter in and around the CCWF2 Project Area. The potential for golden eagle use is likely more constrained to wintering or migration times. Incidental-only eagle observations from both years of studies suggest eagle use is not widespread throughout the CCWF2 Project Area.

3.4.1.5 Bats

There are 13 bat species that have the potential to occur throughout the CCWF2 Project Area, including the federally listed northern long-eared bat (NLEB; *Myotis septentrionalis*). Bats are generally associated with landscape features, such as water resources, trees, and hedge rows. During the Fall Migration Period (FMP; generally, August through October), bats begin moving toward wintering areas and many species of bats initiate reproductive behaviors (Cryan 2008). Bats return from their winter habitats in spring, typically arriving at maternity roosts by mid-to-late spring (generally April to June; South Dakota Bat Working Group [SDBWG] 2004). Potential suitable roosting habitats for bats include deciduous forest, evergreen forest, mixed forest, and woody wetlands (SDBWG 2004, SDGFP 2014). Acoustic field surveys were conducted to characterize general bat occurrence, while a desktop habitat assessment and mist-net surveys were conducted to evaluate the likelihood of NLEB habitat suitability and presence throughout the CCWF2 Project Area.

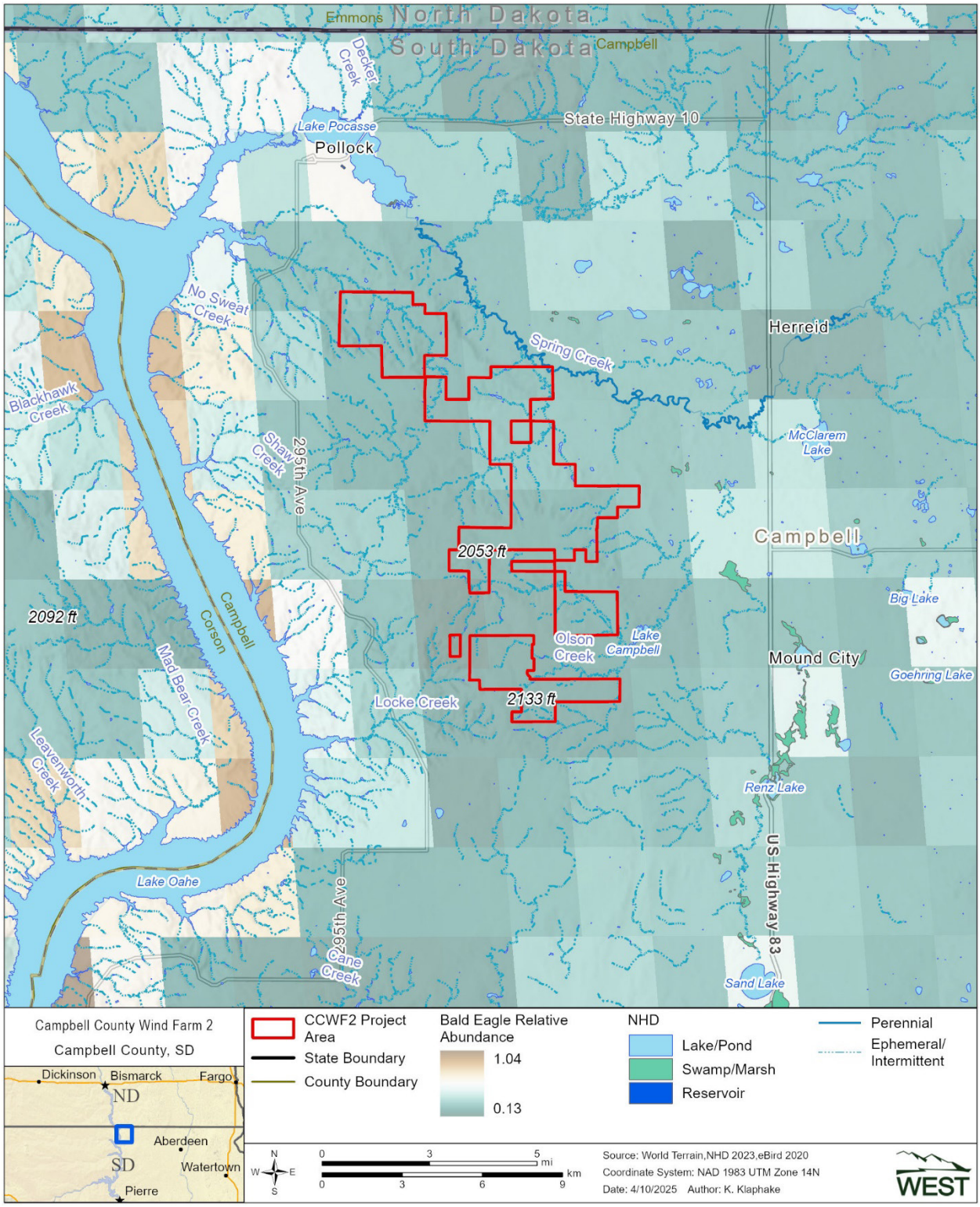

Figure 3.4-1. Bald eagle relative abundance near the CCWF2 Project Area.

Bat activity acoustic surveys were conducted from August 5 to October 23, 2019, and April 17 to June 25, 2020, at two monitoring stations located in the CCWF2 Project Area (see Appendix D for survey details). Bat passes recorded during the general acoustic surveys were not identified to species. Instead, calls were identified to frequency groups (i.e., high-frequency [HF] and low-frequency [LF]). HF calls could include species such as the eastern red bat (*Lasiurus borealis*), little brown bat (*M. lucifugus*), and NLEB. LF calls could include species such as the big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*). Averaging across the two stations, approximately 52% of bat passes were classified as HF and 48% of bat passes were classified as LF (Burns & McDonnell Engineering Company Inc. 2020). Bat activity varied between seasons, with lower activity during the spring and higher activity during the fall. The mean bat activity recorded at ground representative stations during the FMP was 34.1 ± 11.8 bat passes per detector-night. A bat presence/absence mist-net survey was also conducted between July 31 and August 9, 2023, at three to four mist-net locations at two sites within the CCWF2 Project Area. Results of this survey included five eastern red bats, four hoary bats, and two big brown bats (Sirajuddin and Piorkowski 2023).

3.4.2 Environmental Consequences: Proposed Action Alternative

Section 5.6.1.2 of the 2015 PEIS describes common impacts wind energy projects have on wildlife, including wildlife in the CCWF2 Project Area and are incorporated herein by reference. Impacts may occur during all phases of construction, O&M, and decommissioning. Impacts are categorized as direct or indirect, temporary, or permanent, and by the significance of the impacts (i.e., negligible, minor, moderate, substantial).

3.4.2.1 General Wildlife

During Project construction, direct impacts on wildlife species would likely be from injury or mortality from the use of construction equipment in areas with habitats used for foraging, shelter, and/or breeding. These areas would include small swaths of pasture, wooded sites, and riparian areas in the CCWF2 Project Area and a minimal number of individual trees in specific circumstances may need removal. These direct impacts would most likely affect less mobile species, such as denning mammals, amphibians, and reptiles within the CCWF2 Project Area. Indirect impacts from construction activities would involve the temporary disturbance of wildlife in adjacent areas from noise and human activity. These impacts would likely be greatest during the breeding season, when disturbance may lead to abandoned young or reduced fecundity due to behavior alterations, reduction in foraging habitat, and increased stress (see Section 3.10 for more information on noise levels anticipated at the Project). Direct and indirect impacts are expected to be temporary and minor during construction since mainly common wildlife species adapted to disturbance in cultivated cropland, pasture, and edge habitats would be impacted.

During operation, general wildlife would experience direct impacts through the loss of up to 7 ac of small, isolated areas of herbaceous habitat, due to the permanent placement of Project infrastructure in grasslands, pasture, and field edges. This includes the loss of ≈ 1 ac of unbroken grassland (unbroken sod). Because of the small amount of habitat affected and the

availability of alternative habitat in adjacent areas, these permanent impacts would be negligible to minor. The temporary direct and indirect impacts to wildlife during Project decommissioning would mirror those described for the construction phase.

3.4.2.2 Birds

During Project construction, birds could be directly impacted via injury or mortality from removal of vegetation, tree clearing, grading, and other ground/habitat disturbing activities. The Project may include removal of a minimal number of individual trees in specific circumstances, and CCWF2 would limit tree clearing from April 1 to October 31, to minimize impacts to nesting birds during most avian breeding seasons. These activities would be limited to localized areas in the CCWF2 Project Area, and direct impacts from Project construction would be temporary and minor to local bird populations.

Indirect impacts from Project construction could include habitat fragmentation of suitable habitat, including grasslands and wetlands, within the CCWF2 Project Area. Grassland birds were documented as one of the highest proportions of small bird group observations in the summer and winter seasons (Appendix D). Project facilities, primarily access roads and turbine pads, would contribute to fragmentation; 103 ac of herbaceous land cover in the CCWF2 Project Area would be temporarily affected, while impacts to delineated wetlands would be avoided (see Sections 3.2.2 and 3.3.2).

Project operation would primarily result in direct impacts to birds through injury or mortality caused by turbine collisions. Post-construction fatality monitoring reports at wind energy facilities from the USFWS Mountain-Prairie region show a wide variation of bird mortality, ranging from 0.30 to 8.25 birds per MW per year (WEST 2023b). Studies at wind energy facilities in South Dakota have reported a similar range in mortality estimates. A recent post-construction monitoring study at a wind facility in eastern South Dakota reported a total bird fatality rate of 0.23 fatalities per turbine (Chodachek et al. 2022), while a facility in central South Dakota reported a rate of 2.39 fatalities per turbine (Derby et al. 2014). It is expected that the long-term, direct impacts on birds by the Project would have a minor, permanent impact on local bird populations.

Operation of the Project may result in displacement of local birds in the CCWF2 Project Area. Studies indicate that avoidance impacts to birds ranges from 246 to 2,624 ft from a turbine, depending on the environment and the bird species affected (Strickland 2004, Shaffer and Buhl 2016). However, displacement impacts are likely lower at the population level, since displaced birds are not precluded from breeding elsewhere. A recent study from Shaffer et al. (2019) provided a methodology to estimate the displacement effects, up to 300 meters from wind turbines. Using this methodology and the grassland data collected for the Project (Section 3.3.1.2), the Project would indirectly cause avoidance/displacement of ≈ 47.8 ac of broken grassland sod and ≈ 266.0 ac of unbroken grassland sod for use by grassland birds (Shaffer and Buhl 2016, Shaffer et al. 2019, Shaffer et al. 2022). Given the turbines would primarily be placed in existing cropland and impacts to delineated wetlands would be avoided during construction, apart from the 7 ac of herbaceous lands that would be permanently impacted by Project

infrastructure, permanent direct impacts to grassland/wetland habitat are limited. While indirect impacts of displacement from operation are expected to occur, the availability of additional grassland habitat beyond the potential area of displacement, both within and outside the CCWF2 Project Area, as well as the compensatory mitigation committed to by CCWF2 are expected to offset potential impacts due to displacement.

The Project could have direct and indirect impacts on migratory BCC species, including the species observed during Project AU surveys (Table 3.4-2). Previous post-construction fatality monitoring studies have recorded carcasses of grasshopper sparrows and American white pelicans at wind farms in South Dakota (Derby et al. 2014, Chodachek et al. 2022). Research has indicated grassland nesting BCC and SGCN, listed in Section 3.4.1.2, are negatively affected when their habitat becomes fragmented (Bakker 2020). The conservation measures committed to by CCWF2 would minimize impacts to suitable habitat, as noted in Sections 3.2.2 and 3.3.2 above. CCWF2 is also considering additional best management practices and mitigation measures to reduce impacts to migratory bird habitats (Appendix A). The WCS prepared by CCWF2 also outlines conservation measures that have been or will be taken to avoid, minimize, and/or mitigate potential impacts to bird species (Appendix E). Given the limited forested habitats in the CCWF2 Project Area and limited impacts to herbaceous cover, the Project's permanent direct and indirect impacts to migratory BCCs, raptors, and other bird species would have a minor impact.

3.4.2.3 Prairie Grouse

Project construction and operation have the potential to impact prairie grouse directly and indirectly within the CCWF2 Project Area, mainly through direct injury/mortality, human disturbance, and habitat fragmentation. Construction and operational activities could also have impacts on leks in the Analysis Area. CCWF2 has cited all Project infrastructure ≥ 1 mi away from any documented lek, apart from a temporary MET tower. This proposed location would be in disturbed cropland, which has been reviewed and approved by the SDGFP (H. Morey, pers. comm., 2024), and the temporary tower would be removed within four years after construction. Since the Project has been sited away from leks, impacts to prairie grouse are anticipated to be minor.

3.4.2.4 Eagles and Other Raptors

The impacts to nesting and foraging raptors from Project construction would be similar to other birds, including direct mortality or injury from collision and habitat alterations. Tree clearing would be limited to winter months, to minimize the risk of harm. A summary of eagle mortalities at wind facilities in the contiguous U.S. found at least 32 wind energy facilities experienced eagle fatalities (Pagel et al. 2013). Between 2013 and 2018, 49 verifiable records of bald eagle mortalities were reported in the U.S. (Kritz et al. 2018).

The USFWS considers eagle nests ≤ 2-mi of a wind energy facility to be potentially impacted (USFWS 2020b). Impacts to nesting eagles near the CCWF2 Project Area would be unlikely due to the only known nest location being > 2-mi from the CCWF2 Project Area. CCWF2 is

evaluating eagle use at the site to determine the potential for take and would coordinate with the USFWS for take coverage, if deemed necessary.

These impacts could affect several raptor species based on their presence documented in the CCWF2 Project Area and/or presence of suitable habitat. It is expected the Project would have the most impact to red-tailed hawks (*Buteo jamaicensis*) as this species is among the top five raptor species reported as fatalities at wind facilities in the Mountain-Prairie region (WEST 2023b) and was the most common raptor species recorded during AU and raptor nest surveys at the Project (Appendix D). Based on the relatively low presence of raptors in the CCWF2 Project Area, collision fatalities would have a minor, permanent, direct impact on local raptor populations.

3.4.2.5 Bats

Construction, operation, and decommissioning of the Project could have both direct and indirect impacts to bat species within the CCWF2 Project Area. Direct impacts from collisions with turbines and tree clearing could result in injury or morality of bats. CCWF2 would limit tree clearing from April 1 to October 31 to minimize risk to covered bat species. This minimization measure would also protect non-listed bat species that use the same habitat. The WCS prepared by CCWF2 also outlines conservation measures that have been or will be taken to avoid, minimize, and/or mitigate potential impacts to bat species (Appendix E).

Most bat fatalities occur during the FMP and most fatalities occur on nights with relatively low wind speeds (e.g., less than 20 ft per second; Arnett et al. 2008, 2013; Arnett and Baerwald 2013). Typically, wind farm mortality records do not show a comparable spring peak in collision mortality despite the fact bats also migrate during spring. Although reasons for this remain unclear, factors may include differing flight height, migration routes, or mating behavior and courtship flight during spring and fall migration (Cryan 2008, Cryan and Barclay 2009).

To determine potential bat fatality rates for the Analysis Area, publicly available bat fatality rates documented in Minnesota, North Dakota, and South Dakota were reviewed since these states were determined to have similar landscapes and contain a more similar bat composition to the Analysis Area than the other states in the USFWS Midwest and Mountain-Prairie Regions. Public data from these states range from 1.71 to 32.11 bats per turbine per year (WEST 2023b). South Dakota projects report lower values, ranging from 0.78 to 1.71 bats per turbine per year (Derby et al. 2014, Chodachek et al. 2022). It is expected that hoary bat, silver-haired bat, and eastern red bat would be the most common fatalities at the Project, consistent with reported fatalities from many wind facilities and individuals caught during mist-net surveys (Arnett et al. 2008, WEST 2023b; Appendix D).

The CCWF2 Project Area is not expected to support large numbers of bats during the summer season given the limited woodland roosting habitat available. However, farm buildings and other structures are abundant and may provide suitable roosting for certain bat species more tolerant of disturbance. Many bats prefer to forage along forest edges and in forest openings and gaps. Riverine/riparian corridors and drainages provide high quality foraging habitat, as

these features attract concentrations of insect prey and provide open corridors in which bats may fly and effectively locate and capture insect prey (Taylor et al. 2020). Spring Creek may provide potential habitat for bats in the CCWF2 Project Area, although tributaries of Spring Creek are intermittent and would not provide a year-round source of water for bat use (USFWS NWI 2024k). Based on available habitat, bats may roost in the CCWF2 Project Area but are more likely to roost in higher quality habitat along the Missouri River, 2.1 mi to the west. The Project is expected to have negligible, indirect, permanent impacts to potential bat habitat and minor, direct, permanent impacts to bat populations in the CCWF2 Project Area.

3.4.3 Environmental Consequences: No Action Alternative

No Project-related impacts to wildlife would occur, and ongoing impacts, mostly agriculture related, would continue at existing intensities.

3.5 Threatened and Endangered Species

This section analyzes potential impacts from the Project to threatened and endangered species. The general analysis of these resources in Sections 4.6.4 and 5.6.1.4 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for threatened and endangered species is the CCWF2 Project Area. The Project-specific affected environment and impacts for threatened and endangered species are analyzed below.

3.5.1 Affected Environment

Section 4.6.4 of the 2015 PEIS describes the plant and animal species that are listed as threatened or endangered under the ESA that could occur within the UGP Region. Threatened and endangered species that may occur in the CCWF2 Project Area were identified through a query of the USFWS IPaC and include whooping crane (*Grus americana*), NLEB, piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), and pallid sturgeon (*Scaphirhynchus albus*; USFWS 2024b, 2025). Additionally, the western regal fritillary (*Argynnis idalia occidentalis*) proposed to be listed as federally threatened in August 2024 (USFWS 202c), the monarch butterfly (*Danaus plexippus*) proposed to be listed as federally threatened in December 2024 (USFWS 2024d), and the Suckley's Cuckoo Bumble Bee (*Bombus suckleyi)*, proposed to be listed as federally endangered in December 2024 have been included in this analysis. No designated critical habitat for any of these species is in the CCWF2 Project Area; the nearest is the Missouri River (piping plover) 2.1 mi west of the CCWF2 Project Area.

3.5.1.1 Whooping Crane

The CCWF2 Project Area is in the migratory path of the only naturally occurring, self-sustaining population of whooping cranes, the Aransas/Wood Buffalo whooping crane population (AWBP). The AWBP extends from the coast of Texas into several Canadian provinces. The AWBP breeds in Wood Buffalo National Park in Canada and winters along the Texas coast, including in the Aransas National Wildlife Refuge (Urbanek and Lewis 2020). The AWBP migrates through South Dakota annually to northern breeding grounds and southern wintering areas. Spring and fall

migration dates range from late March to mid-May and mid-September to mid-November, respectively. On average, migrating whooping cranes make 11 to 12 overnight stopovers and four multi-day stopovers during each trip.

During migration, whooping cranes must land at suitable stopover habitat to forage or roost. Foraging habitat includes emergent herbaceous wetlands (preferred) and cropland, while roosting habitat includes open water and emergent herbaceous wetlands (Baasch et al. 2019). Wetland size and depth, vegetation characteristics, proximity to anthropogenic features, and proximity to additional foraging resources are documented factors that affect the suitability of potential stopover habitat (USFWS 2007, Niemuth et al. 2018, Pearse et al. 2021).

No whooping crane observations were recorded during the Project's AU surveys (Appendix D) or at the neighboring Campbell County Wind Farm 1 during the 2012 spring and fall AU surveys (WAPA 2015). However, several whooping crane records exist within a 12-mi buffer around the CCWF2 Project Area. A query of the South Dakota Natural Heritage Program identified numerous sightings in the surrounding area, but none in the CCWF2 Project Area (Figure 3.5-1). One adult was observed in a group of sandhill cranes (*Antigone canadensis*) in October of 2004, while three adults were observed in April of 2020 (eBird 2024). It is possible whooping cranes could occur in suitable stopover habitats in the Analysis Area during migration, however, it is likely to be a rare occurrence due to the small population numbers of the AWBP (536 individuals; Butler et al. 2023).

The USFWS, in evaluating the ongoing and anticipated development of wind facilities in the migration corridor, has stated, "[s]uitable stopover habitat in the prairie pothole region of the Dakotas and eastern Montana does not appear to be limited at the present time" (USFWS 2009, Pearse et al. 2021). While the quantity, quality, and distribution of potential stopover habitat in the region likely changes from year to year (Dahl 2014, Pearse et al. 2018, Alemu et al. 2020), whooping crane habitat in the prairie pothole region is typically described as being abundant compared to other portions of the migration corridor (Stahkecker 1997a, 1997b; Bates 2019). This is empirically supported by evidence suggesting site fidelity was more pronounced in areas such as the southern portion of the migration corridor where core use sites were fewer, likely indicating limited available stopover habitat in those areas (Pearse et al. 2020).

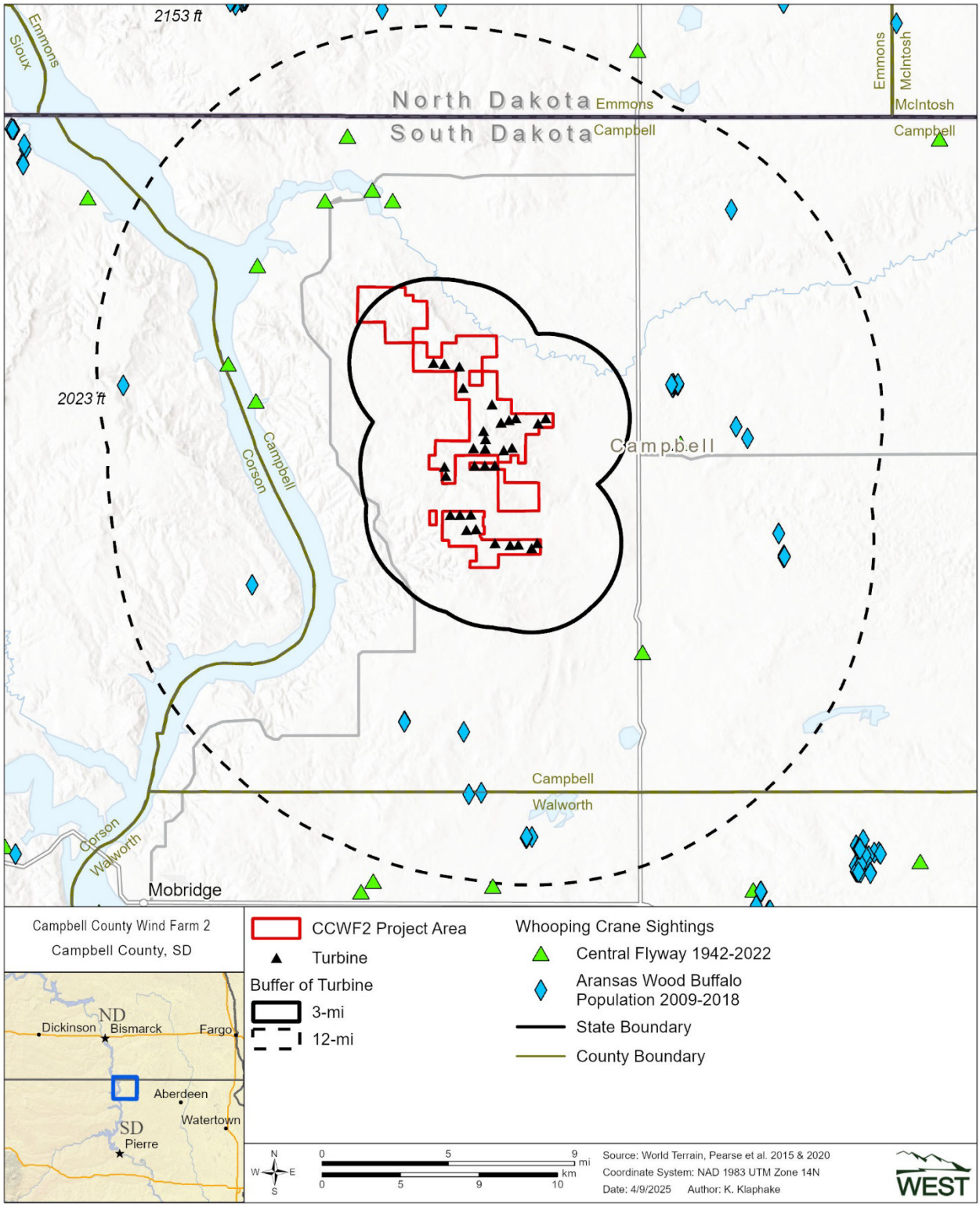

Figure 3.5-1 Whooping crane sightings with 3-mile and 12-mile buffers for the CCWF2 Project Area.

3.5.1.2 Northern Long-eared Bat

The CCWF2 Project Area is in the western tier of the NLEB estimated range (Bat Conservation International 2024). This species occurs in South Dakota throughout the year, including during hibernation, spring and fall migrations to and from hibernacula, and the summer maternity season. However, they are mainly found in narrow, riparian corridors (SDGFP 2014, Andersen and Geluso 2022). The South Dakota Natural Heritage Database identified records of NLEBs ≈ 15 mi south of the CCWF2 Project Area in Lake Hiddenwood State Park.

This medium-sized bat (3.0 to 3.7 inches long) is a generalist predator of aerial invertebrates. This species forages at night in mainly mature forested areas, along forest edges, and in small clearings. NLEBs use different roost sites in different seasons. In winter, NLEBs mainly hibernate in caves and mines, singly or in small numbers. During summer, they typically roost singly or in maternity colonies under bark, in crevices, or in cavities of live or dead trees, though males and non-reproductive females may roost in caves or mines. NLEBs also may roost in buildings, barns, bat houses, behind window shutters, under bridges, and on utility poles. Nighttime foraging consists of feeding on insects, which the bats catch while in flight using echolocation or by gleaning motionless insects from vegetation and water surfaces (USFWS 2015).

The Analysis Area for evaluating effects to NLEBs includes the area within a 2.5-mi buffer around Project infrastructure, based on guidance from the *Range-wide Indiana Bat Survey Guidelines* (USFWS 2020a; Figure 3.5-2). Following the WEG, pre-construction bat acoustic surveys were completed at two bat acoustic stations within the CCWF2 Project Area in the fall of 2019 and spring of 2020 (see Section 3.4.1 and Appendix D for additional details). These bat acoustic surveys did not identify bats by species, but rather according to the frequency of their calls. Bats were grouped either as LF or HF bats. Since NLEBs fall within the HF category, results of these surveys cannot definitively confirm presence within the CCWF2 Project Area. Acoustic surveys were also conducted at the neighboring Campbell County Wind Farm 1 during the fall of 2010. Call results of this survey were not identified to species level and could not be used to definitively confirm presence of NLEB in the area (WAPA 2015).

Suitable NLEB habitat in the Analysis Area was evaluated for the presence and connectivity of forested areas that might be used for roosting, foraging, and traveling or commuting corridors. Forest patches in the Analysis Area were identified from aerial imagery and were found to occur as isolated stands of trees, most often with little connectivity. A 1,000-ft buffer was placed around forest patches of 10 ac or greater in size. These areas were considered suitable NLEB roosting/foraging habitat (Figure 3.5-2).

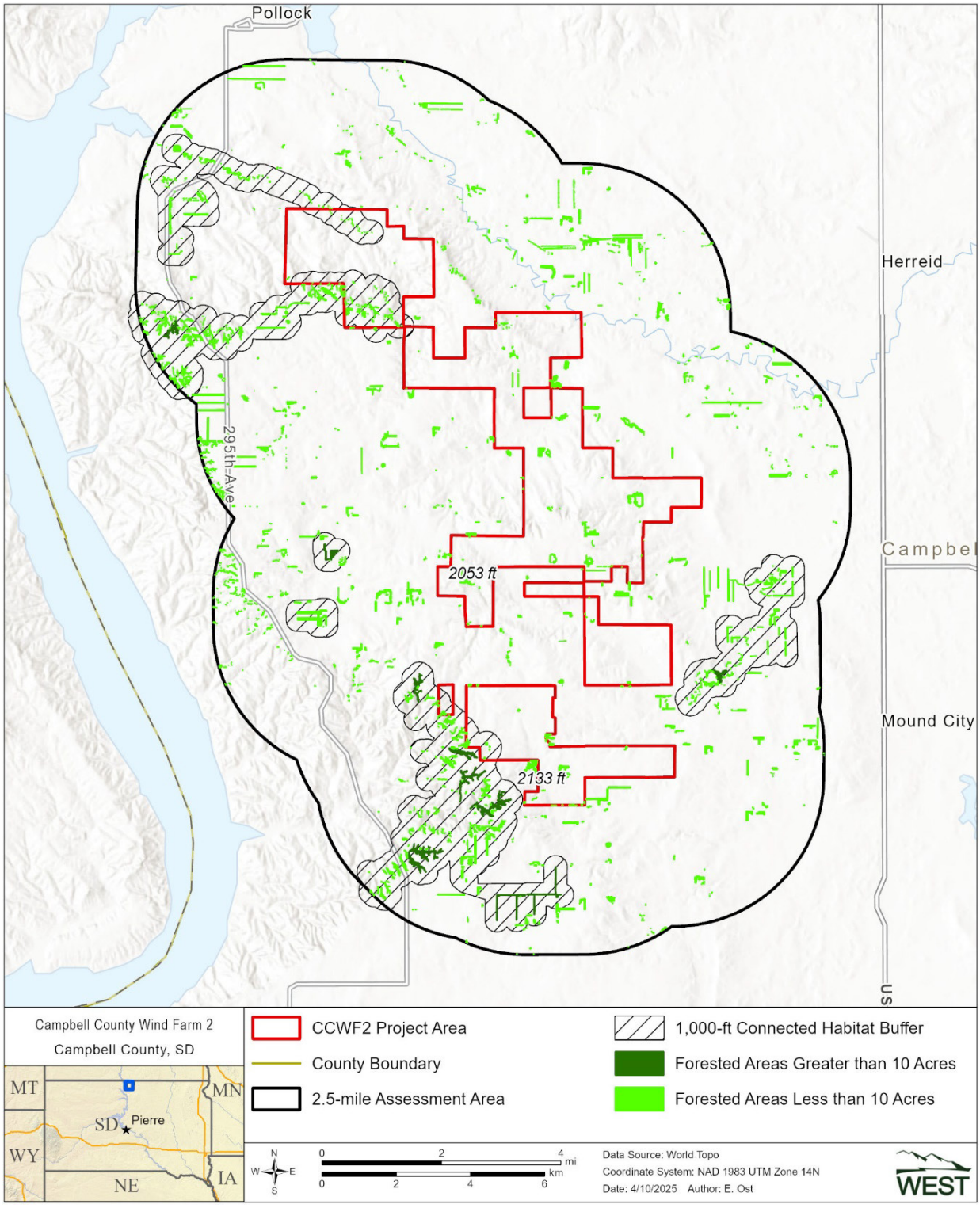

Figure 3.5-2. Results of the Northern Long-eared Bat Summer Habitat Assessment for the CCWF2 Project Area.

While NLEB presence was assumed at each patch of trees 10 ac or greater in size, presence/absence mist-net surveys were completed in August of 2023, in which no NLEBs were captured (Appendix D). These cumulative assessments and survey results show probable absence of the NLEB in the CCWF2 Project Area during the summer. The species could pass through the CCWF2 Project Area seasonally in the spring and fall, although no spring or fall occurrences have been documented based on publicly available data. The Project occurs within the USFWS NLEB Range for Wind Energy Projects, and USFWS presumes presence of NLEB in the project area during migration (USFWS 2024m and USFWS 2024n).

3.5.1.3 Piping Plover

Piping plovers are small, migratory shorebirds that breed in limited regions of the U.S. The Northern Great Plains population occurs along rivers and lakes in the region and breeds from Canada to Colorado. Typical piping plover habitat includes sandy riverbanks, sand bars, and alkali lakes. Piping plovers arrive on breeding grounds in early April and nest in mid-to-late April (Elliott-Smith and Haig 2020). Piping plovers nest in shallow depressions and their eggs hatch from late May to early June on exposed habitat, mainly sandbars with low vegetative cover (SDGFP 2005). Fledging occurs 25 to 35 days after hatching (USFWS 2024f). In South Dakota, piping plovers nest between May 1 and August 15 (SDGFP 2005).

Piping plovers are closely associated with the Missouri River in South Dakota. Available nesting habitat varies annually depending on water levels. The nearest suitable habitat includes the Missouri River, which is 2.1 mi from the Analysis Area (Figure 3.5-3). For piping plovers nesting on the Missouri River, overland movements are likely. The extent of overland movements by this species is not known; however, the proximity of the Project to the Missouri River might increase the potential for on-site occurrence during migration, breeding, or dispersal. While piping plovers seem to prefer sandy riverbanks and sand bars, piping plovers are also known to nest on alkali lakes with exposed habitat (SDGFP 2005). No alkali lakes occur in the Analysis Area and most alkali lake occurrences are in North Dakota. In dry years, seasonal (e.g., dried up) wetlands with exposed shore in the Analysis Area could provide piping plover habitat. There is limited (e.g., seasonal wetlands) habitat in the CCWF2 Project Area to attract piping plover from the Missouri River corridor.

The nearest reported piping plover is a 2016 sighting 16.3 mi from the Project (eBird 2024). Most publicly available observations of piping plover near the Project occur around the city of Mobridge, 16.5 mi west of the Project. No piping plover observations were made during AU surveys, nor were they observed incidentally while conducting other wildlife surveys at the Project (Appendix D). No alkali lakes were observed in the CCWF2 Project Area; therefore, the nearest suitable and critical habitat for piping plover is the Missouri River, 2.1 mi west of the Project (Figure 3.5-3).

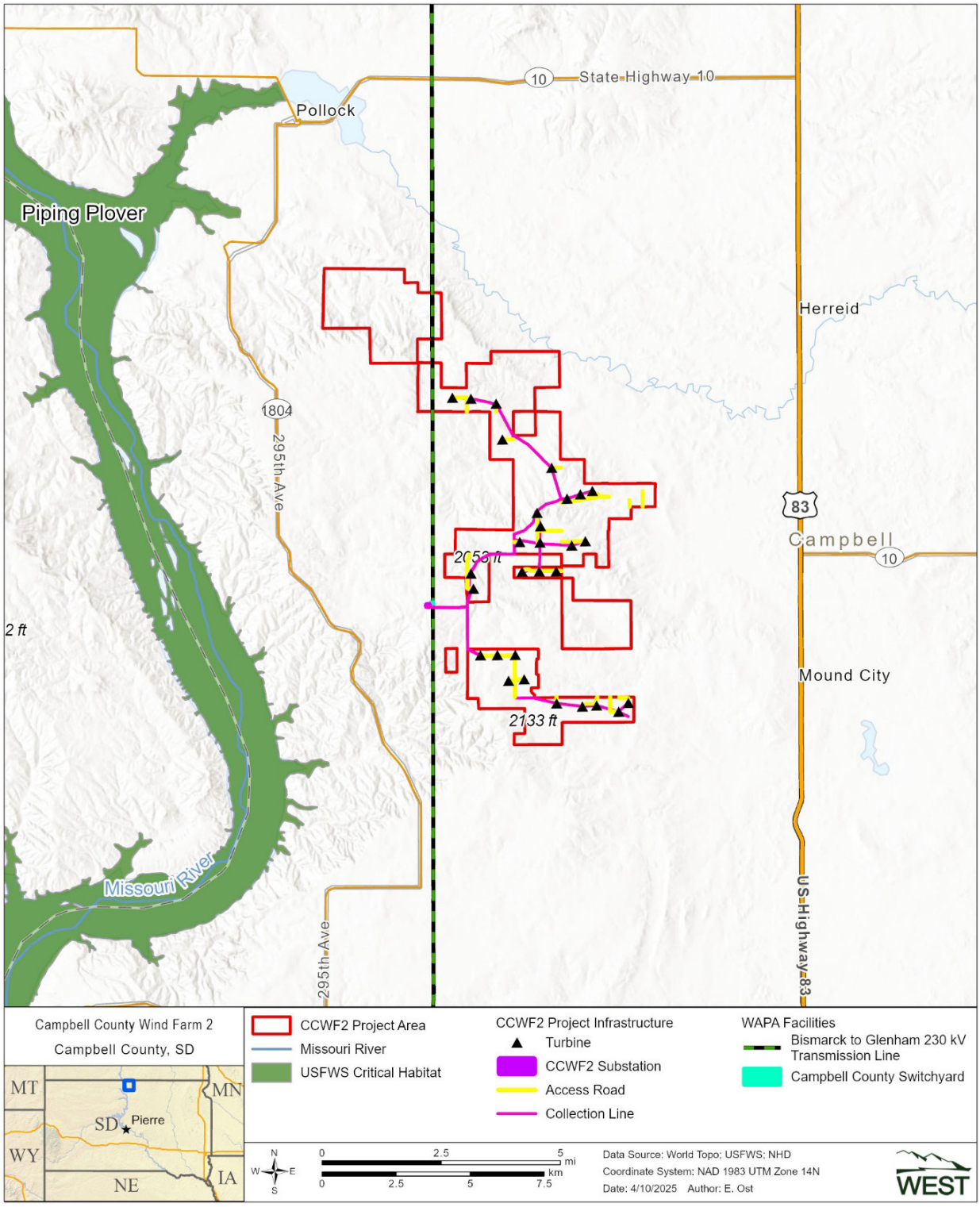

Figure 3.5-3. Piping Plover Critical Habitat and in relation to the CCWF2 Project Area.

3.5.1.4 Rufa Red Knot

The rufa red knot is a coastal shorebird, occurring in South Dakota as a seasonal migrant. Small numbers of rufa red knots are reported annually across the interior of the U.S. during their spring and fall migration. These reported sightings are concentrated along the Great Lakes, but multiple reports have been made from nearly every interior state, including South Dakota (eBird 2024). Rufa red knots nest in the Arctic and winter mainly in Florida, the adjacent Gulf Coast and Caribbean, northern Brazil, and the Chilean and Argentine Tierra del Fuego (American Bird Conservancy 2024). The long-distance migrations between nesting and wintering sites can be over 9,000 mi and occur twice each year, in spring and autumn. During migration, the birds mainly use marine habitats, but frequent shorelines of larger lakes or freshwater marshes when they occasionally appear at interior locations (Cornell Lab of Ornithology 2024).

Rufa red knot does not breed in South Dakota but could be an occasional migrant during the spring and fall. There were 29 sightings of rufa red knot reported in South Dakota since 2002 (eBird 2024). The nearest potential rufa red knot habitat is 2.1 mi west of the CCWF2 Project Area, at the Missouri River (Figure 3.5-3). The nearest reported rufa red knot, detected in 2022, was 28.3 mi from the CCWF2 Project Area (eBird 2024).

3.5.1.5 Pallid Sturgeon

The pallid sturgeon is bottom-oriented and adapted to large, free-flowing, warm-water, and turbid rivers with a diverse assemblage of physical habitats (USFWS 2014). This migratory species inhabits the Missouri and Mississippi Rivers and some of the rivers' connected tributaries and lakes (USFWS 2024g). The pallid sturgeon is generally associated with deep turbid waters in the main channels of large rivers (Kallemeyn 1983, Erickson 1992, Wanner et al. 2007). Females spawn every two to three years and spawning occurs between March and July (USFWS 2014). Spawning appears to occur over firm substrates, in deeper water, with relatively fast, turbulent flows, and is driven by environmental factors such as flow, water temperature, and day length (USFWS 2014; The Pallid Sturgeon Recovery Program 2022).

The pallid sturgeon is known or believed to occur in South Dakota, in the Missouri River through the southern half of the state; however, not in Campbell County (USFWS 2024g). The nearest potential pallid sturgeon habitat is 2.1 mi west of the CCWF2 Project Area, in the Missouri River.

3.5.1.6 Western Regal Fritillary

The western regal fritillary currently occupies portions of 14 states, including South Dakota, and the CCWF2 Project Area is located within the Northern Great Plains Representation Unit (RU) of the species' range (USFWS 2023b). When compared to the other RUs, the Northern Great Plains RU supports relatively more intact and better-connected grasslands, primarily used for livestock grazing or haying; however, the grasslands are drier and more prone to drought, have fewer tallgrass species comprising the grasslands and experience shorter growing seasons and colder weather, which may reduce the quality of the habitats for the western regal fritillary (USFWS 2024h). In South Dakota, the western regal fritillary has currently been documented in half of

the state's counties; however, it has been historically documented (prior to 2010) in Campbell County (USFWS 2023b).

The western regal fritillary is a large, nonmigratory butterfly found in tallgrass prairies and wet prairie habitats with more leaf litter and lower grazing intensities (Selby 2007; Caven et al. 2017; USFWS 2023b). The western regal fritillary requires large areas of native prairie; however, the precise number of acres necessary to support the species over the long term varies among scientific literature (USFWS 2023b). The USFWS considers 247 ac (100 ha) of suitable habitat as a minimum patch size to support small populations, while 2,471 ac (1,000 ha) or more would support a healthy, large population (USFWS 2023b). The western regal fritillary generally avoids areas with bare ground, altered landscapes, or developed areas that surround prairie remnants (Selby 2007). Western regal fritillary do not migrate (Crawford and Tronstad 2020), but are capable of strong, rapid flight for individual movement (Selby 2007) and require native warm-season bunchgrasses and flowering plants at all life stages (Caven et al. 2017).

Females lay eggs in late summer and early fall on the underside of dying vegetation in suitable prairie habitats (USFWS 2023b). Larvae overwinter in leaf litter, emerge in spring (USFWS 2023b), and feed exclusively on violets (*Viola spp.*). For all stages of their life cycle, the species further requires prairies containing a variety of high density, flowering plants as nectar resources for adults, native tall or mixed height warm-season bunchgrasses that provide tussocks and vegetative litter for shelter (all life stages), shrubs and tall vegetation as shelter for adults, ambient temperatures for larvae and pupae development, and moisture for vegetative productivity (Crawford and Tronstad 2020; USFWS 2023b). The flight period for adults spans late spring to mid-autumn; they emerge as early as May in the southern portion of the range to late July in the northern portion, with a peak in numbers in July when mating occurs (USFWS 2023b).

A Grassland Habitat Assessment was completed (Appendix D) and approximately 47% of the CCWF2 Project Area is grasslands, with 5,108 ac of unbroken sod (native prairie) and 508 ac of broken sod (other grasslands that have been mechanically manipulated historically). This grassland habitat may contain the necessary native vegetation components to provide potentially suitable habitat for the western regal fritillary and occurs in areas large enough to support small populations (Figure 3.5-4).

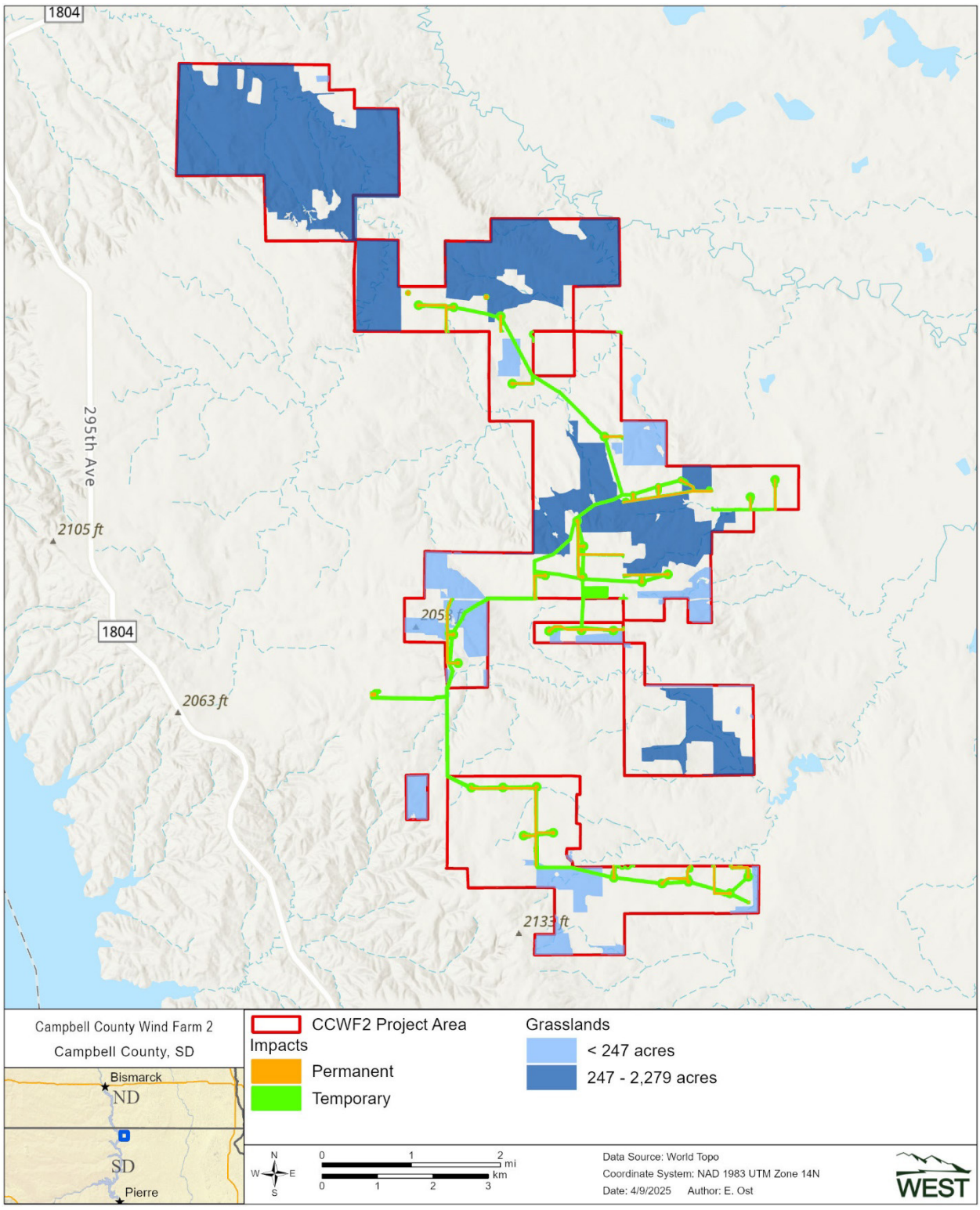

Figure 3.5-4. Potential Western Regal Fritillary, Monarch Butterfly and Suckley's Cuckoo Bumble Bee Habitat within the CCWF2 Project Area.

3.5.1.7 Monarch Butterfly

The monarch is a large, migratory butterfly found in a variety of herbaceous habitats. Monarchs within the CCWF2 Project Area belong to the eastern North American migratory population, arriving by June to breed and departing in August to migrate to wintering grounds in Mexico (Monarch Joint Venture 2024). Monarchs lay their eggs exclusively on milkweed (*Asclepias* spp.) and larvae (commonly referred to as caterpillars) feed on the milkweed plants until they complete metamorphosis and emerge as adults. Adult monarchs feed on nectar from a variety of flowers during the breeding season, migration, and overwintering (USFWS 2024i). Most adult butterflies live approximately two to five weeks, and there are multiple generations of monarchs produced during the breeding season; however, overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months (USFWS 2020c). Although monarchs may be found throughout South Dakota, the South Dakota Monarch Conservation and Management Strategic Plan (SDGFP 2018b) identifies eastern South Dakota (east of the Missouri River) as a management emphasis boundary for the monarch because of its relevance to the state's geography and related land uses.

Potentially suitable habitat for the monarch butterfly could occur wherever native flowering plants and milkweed grow within the CCWF2 Project Area. Similar to the western regal fritillary, the 5,616 ac of grassland identified in the Grassland Habitat Assessment (Appendix D) may contain the necessary native vegetation components to provide potential habitat for the monarch. In addition, monarchs may occur along roadsides, in open and/or disturbed areas, and within riparian habitats.

3.5.1.8 Suckley's Cuckoo Bumble Bee

The Suckley's Cuckoo bumble bee (SCBB) has a broad distribution across North America and has been known to occur in 17 US states and every Canadian province and territory except Nunavut. The SCBB is one of six cuckoo bumble bee species in North America and is a medium size, obligate social parasite, invading the nests of bumble bees of the subgenus *Bombus* (COSEWIC 2019, USFWS 2024l). Confirmed host species for the SCBB include the Western bumble bee (*B. occidentalis*) and Nevada bumble bee (*B. nevadensis*). Female SCBB do not have the ability to collect pollen for their offspring and rely on worker bees from a host colony to raise young (USFWS 2024l). Both the Western and Nevada bumble bee species primarily nest underground in crevices and abandoned rodent burrows, and infrequently nest above ground in leaf litter/plant matter (MT NHP 2025, Xerces Society 2023). SCBB are found in a wide variety of habitats including meadows, grasslands, farms, woodlands, with the transition zone between habitat types being especially valuable for nesting (USFWS 2024l). Ultimately, the SCBB is entirely dependent on host bumble bee colonies, making these colonies a critical habitat need for the species (USFWS 2024l). Much information is lacking on the life history, forage, and habitat requirements for the SCBB; however they are considered a generalist forager, that require a wide variety of floral and nectar resources (Hines and Hendrix 2005). Threats to the SCBB include widespread use of pesticides and herbicides, competition from commercial/managed bees, decline of host species populations and habitat loss due to conversion and fragmentation (USFWS 2024l). The SCBB has not been detected in the United

States since 2016. The most recent detection of SCBB within the state of South Dakota occurred prior to 2000, despite increased efforts to survey bumble bees in the Great Plains (USFWS 2024l, Xerces Society 2025). One of the host species for the SCBB, the Nevada bumble bee has been documented most recently in Edmunds County, South Dakota in 2024 (Xerces Society 2025). Western bumble bee has only been documented in the Black Hills region of South Dakota, outside of the level II Ecoregion from the Project (Xerces Society 2025).

Potentially suitable habitat for SCBB and its host species could occur wherever native flowering plants occur in the CCWF2 Project Area. Similar to the western regal fritillary and monarch butterfly, the 5,616 ac of grassland identified in the Grassland Habitat Assessment (Appendix D) may contain the necessary floral and nectar components to provide potential habitat for SCBB and associated host species.

3.5.2 Environmental Effects: Proposed Action Alternative

3.5.2.1 Effects Determinations

CCWF2 would follow applicable conservation measures required in the 2015 PEIS and 2015 Upper Great Plains Wind Energy Programmatic Biological Assessment, as listed in the species consistency evaluation forms, to ensure the Project would not significantly affect federally listed species. These measures are listed individually by species below. WAPA has conducted informal Section 7 consultation with the USFWS in compliance with the ESA by submitting the Project's consistency evaluation forms along with other documentation, as relevant, to the USFWS (Appendix F). Conservation measures for water resources (Section 3.2), vegetation (Section 3.3), and wildlife (Section 3.4) could also benefit threatened, endangered, and proposed listed species

3.5.2.2 Whooping Crane

The Project may affect whooping cranes from construction, operation, and decommissioning activities. However, as the Project would avoid impacts to delineated wetlands by boring beneath them (Table 3.2-3), there would be no loss of whooping crane habitat due to filling wetlands to construct Project infrastructure.

Direct impacts of the Project could include whooping crane collisions with Project facilities resulting in their mortality or injury. Collision with Project facilities could occur at turbines, the transmission line, or MET towers. In addition, collisions could occur with industrial equipment used during construction or decommissioning. The likelihood of whooping crane collisions with wind turbines at the Project is low due to the tendency of migrating whooping cranes to avoid wind energy facilities (USFWS 2009). Pearse et al. (2021) stated the observed avoidance of wind turbines by three mi decreases the probability that collisions with these structures may occur.

Additionally, no documented whooping crane fatalities related to turbine collisions have been recorded to date (USFWS 2009, American Wind Wildlife Institute 2020, WEST 2023b). The likelihood of whooping crane collisions with other Project infrastructure, such as the

transmission line and MET towers, would also be low. Collision risk with the transmission line at the Project would be low because the power line between the substation and POI is short (≈ 277 ft) and it would be outfitted with bird flight diverters. The use of underground collection lines also reduces the risk of collision mortality.

Indirect effects to whooping cranes may result from degradation of existing habitat, loss of potentially suitable habitat, or additional whooping crane behavioral responses to the operations of the Project. Since whooping cranes may avoid habitat within ≈ three mi of turbines (Pearse et al. 2021), there is an assumed loss of potentially suitable stopover habitat near wind turbines. Thus, the preferred species-specific guidance from the 2015 Wind Programmatic Biological Assessment is avoidance of all infrastructure ≤ one mi of wetlands that provide potentially suitable habitat. While siting to avoid wetlands was conducted to the extent possible, it was not feasible for CCWF2 to site turbines over one mile away from wetlands given other constraints on the Project (see Table 2.1-2 above). Since Project turbines will be located in this buffer, CCWF2 has elected to complete the species-specific minimization measure, which allows for the acreage of suitable wetlands located ≤ 0.5 mi of turbines to be offset. Suitable stopover habitat was assessed within a 0.5-mi buffer around the CCWF2 Project Area, collectively referred to as the Analysis Area, and it was determined to be a total of 132.6 ac. CCWF2 has entered into an agreement with South Dakota Chapter of Ducks Unlimited to establish the offsets for 132.6 acres of potential suitable whooping crane habitat. More detail regarding this assessment can be found in Appendix F: Species Consistency Evaluation Forms.

Degradation of suitable stopover habitat can occur from Project-related surface water runoff and deposition of eroded soils in wetland areas. These impacts are expected to be minor at the Project because, as described in Sections 3.2.1 and 3.2.2, surface water and wetland effects would be minimized by the implementation of conservation measures and compliance with a general permit for stormwater discharges from the SDDANR for construction activities and a permit from the USACE for wetland effects.

The following conservation measures would be implemented at the Project to reduce potential effects to whooping cranes:

- CCWF2 would complete ≥ one year of avian and bat fatality monitoring consistent with recommendations for operations monitoring included in the WEG, 2015 PEIS, Species Consistency Evaluation Forms, and the USFWS' *Draft Land-based Wind Energy Voluntary Avoidance Guidance for the Northern Long-eared Bat*, as applicable.
- Operational monitoring would be conducted during whooping crane migration seasons. Operations staff would be trained to identify whooping cranes, and turbines within 2.0 mi of whooping cranes would be shut down until the whooping cranes moved on naturally, as per the Project's whooping crane operational monitoring plan.
- The use of guy wires on MET towers would be avoided. If guy wires would be installed, all guy wires would be marked and maintained with approved bird flight diverters following Avian Power Line Interaction Committee (APLIC) standards (APLIC 2012).

- Bird flight diverters consistent with APLIC standards would be placed and maintained on the top static wire of overhead transmission lines.
- A whooping crane observation plan and turbine shutdown protocol would be implemented during whooping crane migration periods for the life of the Project (Appendix G).
- Participation in an environmental awareness training program would be required for Project staff and subcontractors working on-site. The program includes training participants in the proper identification, response protocol, and reporting of sandhill and whooping cranes.
- CCWF2 commits to funding habitat offsets of 133.6 ac of wetlands that fall within the category of suitable stopover wetland habitat within South Dakota.

With implementation of whooping crane species-specific conservation measures and considering the best available data, there would be discountable direct and indirect impacts to whooping cranes during construction, operations, and decommissioning. WAPA has determined the Project *may affect, but is not likely to adversely affect***,** the whooping crane.

3.5.2.3 Northern Long-Eared Bat

The Project may affect the NLEB from construction, operation, and decommissioning of Project infrastructure. Direct and indirect impacts to the NLEB, including injury or mortality and noise disturbance, may occur during tree clearing activities for construction. To avoid impacts to NLEBs during construction, tree clearing would be limited during the NLEB's active season (April 15 to October 31).

Direct effects to NLEB could include injury or death due to collisions with Project turbines. The risk of collision has been minimized by siting Project infrastructure ≥ 0.5-mi from suitable NLEB roosting/foraging habitat (Figure 3.5-3). Collision risk for bats is highest during the FMP, when activity for all bat species is typically higher and bats travel from their summer habitat to hibernacula. NLEBs are not considered long-distance migrants and typically travel ≤ 55 mi between hibernacula and summer habitat (USFWS 2022). Recently, the use of rock-crevice hibernaculum by the species has been confirmed along the Missouri River, near the Nebraska/South Dakota border (White et al. 2020). This indicates that undocumented rock crevices as hibernacula may be used by the species elsewhere in the state along the Missouri River. The nearest known hibernacula are 180 mi from the Project in the Black Hills of South Dakota, which is more than twice the species known migration range from hibernacula. Although suitable NLEB habitat exists in the Analysis Area, the likelihood of the species' presence is minimal due to the distance to the nearest known hibernacula. These factors lead to a reduced risk of collision with Project infrastructure.

Based on Project presence/probable absence surveys, limited habitat acreage, and rarity of the species, summer risk for the NLEB is not anticipated to occur. However, the species may collide with turbines during spring and fall migration. To ensure take is unlikely to occur, the Project would implement the applicable measures as listed below.

- CCWF2 would complete ≥ one year of Tier 4a avian and bat fatality monitoring efforts consistent with recommendations for operations monitoring included in the WEG, 2015 PEIS and Species Consistency Evaluation Forms. This post-construction study would use the Evidence of Absence estimator to achieve a minimum detection probability (g-value) of 0.2 and analyze fatality estimates.
- From ½ hour before sunset to ½ hour after sunrise, CCWF2 would raise turbine cut-in speeds at all Project turbines from 3.0 m/s to 5.0 m/s during the South Dakota NLEB FMP (August 16 – October 31), when temperatures exceed 40° F (4.44° C).
- Feather blades to the manufacturer's cut-in speed from sunset to sunrise, when the temperature is above 40° Fahrenheit, from June 1 – August 31.
- No siting of turbines within 1,000 ft of potentially suitable summer habitat.
- Implementation of a Wildlife Incident and Reporting System to be developed for the Project to notify the USFWS South Dakota Ecological Services Field Office if an injured or dead NLEB is detected.

The USFWS released the final *Land-based Wind Energy Voluntary Operational Avoidance Guidance for the Northern Long-eared Bat* in October 2024 (USFWS 2024m), which includes recommended conservation measures (e.g. curtailment windows) that differ from those in the 2015 version of the PBA Consistency Evaluation Form, which was previously completed by the Project. The PBA allows for amendments to be made when new information reveals effects on species or critical habitat (WAPA and USFWS 2015). WAPA and USFWS completed an amendment to the PBA in December of 2024, and updated the NLEB Consistency Evaluation Form to reflect the finalized NLEB avoidance guidance. CCWF2 agreed to adhere to the new guidance, and updated NLEB Consistency Evaluation forms were completed by the Project, WAPA and USFWS in April 2025. Based on the commitments concurred with, there is a negligible risk of direct or indirect impacts to NLEB, and there is no change in the significance of impacts to NLEB between the publication of Draft EA and the Final EA following the issuance of the final NLEB guidance (USFWS 2024m). WAPA determined the Proposed Action *may affect, but is not likely to adversely affect* the NLEB.

3.5.2.4 Piping Plover

Because of the lack of reported piping plover sightings in and near the Analysis Area and the lack of suitable habitat, except in dry years when dried up wetlands with exposed shore could provide piping plover habitat, direct Project impacts to piping plover are unlikely. Piping plovers are more likely to be attracted to and use suitable habitat along the Missouri River rather than the marginal habitat in the Analysis Area. Because piping plover are unlikely to use the Analysis Area, collision risk with turbines is low. While collision with other project infrastructures is possible (i.e., the 277 ft of proposed overhead power line replacement, MET towers, vehicles), conservation measures such as bird flight diverters, unguyed towers, and reduced vehicle speeds would be used to minimize the potential for collision.

The Project would have minimal direct habitat effects when considering the availability of wetlands in the CCWF2 Project Area, surrounding area, and the proximity of more suitable habitat along the Missouri River 2.1 mi from the CCWF2 Project Area). As the Project would avoid impacts to delineated wetlands (Table 3.2-3), it would not affect the 406 ac of wetlands in the CCWF2 Project Area. Conservation measures for water resources described in Section 3.2.2.3 would further reduce the potential for Project effects to piping plover habitat (wetlands) in the area. The environmental commitments identified in Section 3.4.1 to minimize wildlife impacts associated with the Project would reduce impacts to piping plovers. Additionally, conservation measures to offset impacts to 132.6 ac of wetlands for whooping cranes would also benefit other avian species with the potential to use wetlands, such as piping plovers.

WAPA has determined the Project *may affect, but is not likely to adversely affect,* the piping plover.

3.5.2.5 Rufa Red Knot

Mortality due to collision with Project wind turbines is possible, but collision risk is low because rufa red knot would be a rare migrant in the CCWF2 Project Area. Rufa red knots flying at migratory altitudes are likely to be above the rotor-swept area, but few direct measurements of flight altitudes are available for red knots (O'Connell et al. 2011). The birds could occur in rotor swept altitudes and may occur at those altitudes more frequently during ascent or descent from long distance flight, or during short distance flights between areas used for feeding and roosting (Loring et al. 2018). However, migrating rufa red knot are more likely to be ascending or descending to feeding and roosting sites along the Missouri River, 2.1 mi west of the Project, than in the Analysis Area since the birds seem to prefer shorelines of larger lakes. However, rufa red knots could use wetlands found in and near the CCWF2 Project Area. Based on publicly available data (WEST 2023b), there have been no known fatalities of this species at wind energy facilities in the UGP. It is possible the presence of the Project could cause migrating rufa red knots to avoid the CCWF2 Project Area, however, data specific to rufa red knot avoidance of wind turbines is limited, especially inland.

The Project would have minimal direct habitat effects when considering the availability of wetlands in the CCWF2 Project Area, surrounding area, and the proximity of more suitable habitat along the Missouri River 2.1 mi from the CCWF2 Project Area). As the Project would avoid impacts to delineated wetlands (Table 3.2-3), it would not affect the 406 ac of wetlands in the CCWF2 Project Area. Conservation measures for water resources described in Section 3.2.2.3 would further reduce the potential for Project effects to red knot habitat (wetlands) in the area. The environmental commitments identified in Section 3.4.1 to minimize wildlife impacts associated with the Project would reduce impacts to red knots. Additionally, conservation measures to mitigate impacts to 132.6 ac of wetlands for whooping cranes would also benefit other avian species with the potential to use wetlands, such as rufa red knots.

WAPA has determined the Project *may affect, but is not likely to adversely affect,* the rufa red knot.

3.5.2.6 Pallid Sturgeon

As the Project is located 2.1 mi from the Missouri River, construction, operation, and decommissioning of the infrastructure would not have a direct effect on the pallid sturgeon or its habitat. Indirect impacts to the species could include contamination of runoff that could make its way to the Missouri River; however, considering the Project would comply with the Clean Water Act and minimize impacts to water resources, and the distance of the Project to the potential habitat, indirect impacts are unlikely. Therefore, WAPA has determined the Project will have *no effect* on the pallid sturgeon.

3.5.2.7 Western Regal Fritillary

The Project may affect the western regal fritillary from construction, operation, and decommissioning of Project infrastructure. Direct impacts to the western regal fritillary could occur if construction equipment should harm any of the life stages of the species during construction or decommissioning. The risk of direct harm by industrial equipment has been minimized by siting Project turbines outside of native, unbroken grasslands, as recommended by the SDGFP. Indirect impacts to the western regal fritillary may result from degradation of existing habitat or loss of potentially suitable habitat. Habitat could be crushed or trampled by vehicles, equipment, or workers during construction and decommissioning activities.

The loss of western regal fritillary habitat, such as disturbing grasslands to construct infrastructure, in the CCWF2 Project Area would be minimal. The Project would temporarily impact ≈ 48.4 ac of grasslands (≈ 33.9 ac of unbroken sod and ≈ 14.6 ac of broken sod) during construction and permanently impact ≈ 2.2 ac (≈ 1.0 ac of unbroken sod and ≈ 1.2 ac broken sod) during operation (Section 3.3.2.2). Construction-related impacts would be temporary, and the ≈ 48.4 ac of grassland disturbed during construction would be restored. Relative to the abundance of grassland in the surrounding area, the ≈ 2.2 ac of permanent grassland impact due to Project operation is minimal on local and landscape scales.

The Project is not likely to result in jeopardy to the species based on the potential impacts identified above. In the event the final rule for the western regal fritillary classifies the species as ESA threatened, CCWF2 would reassess whether take could occur based on the final rule and coordinate with the USFWS on whether an incidental take permit and habitat conservation plan may be warranted under Section 10 of the ESA.

3.5.2.8 Monarch Butterfly

The Project may affect the monarch butterfly from construction, operation, and decommissioning of Project infrastructure. Disturbance, injury, or mortality of monarch butterfly individuals could occur while they are present during summer months; loss, degradation, or alteration of monarch butterfly habitats or resources (e.g., milkweed an obligate host plant for the monarch butterfly eggs and larva and other flowering plants) could occur, resulting in reduced survivorship or reproductive success; or features on the landscape could be created that may cause monarch butterfly displacement or avoidance.

Similar to the western regal fritillary, monarch butterfly habitat loss due to grassland disturbance in the CCWF2 Project Area would be minimal. The Project would temporarily impact ≈ 48.4 ac of grasslands during construction (Section 3.3.2.2), which would be restored following construction. The Project would permanently impact ≈ 2.2 ac during operation (Section 3.3.2.2). Relative to the abundance of grassland in the surrounding area, the ≈ 2.2 ac of permanent grassland impact due to Project operation is minimal on local and landscape scales.

Because the Project is not likely to result in jeopardy to the species based on the potential impacts identified, and given that it is uncertain what would constitute prohibited take under a 4(d) Rule should it become listed, CCWF2 would reassess whether take could occur based on the final rule and coordinate with the USFWS on whether an incidental take permit and habitat conservation plan may be warranted under Section 10 of the ESA.

3.5.2.9 Suckley's Cuckoo Bumble Bee

The Project may affect the SCBB from construction, operation, and decommissioning of Project infrastructure. Disturbance, injury, or mortality of SCBB individuals could occur while they are active between April and October; loss, degradation, or alteration of SCBB or host bumble bee habitats or floral and nectar resources could occur, resulting in reduced survivorship or reproductive success.

Similar to the western regal fritillary and monarch butterfly, bumble bee habitat loss due to grassland disturbance in the CCWF2 Project Area would be minimal. The Project would temporarily impact ≈ 48.4 ac of grasslands during construction (Section 3.3.2.2), which would be restored following construction. The Project would permanently impact ≈ 2.2 ac during operation (Section 3.3.2.2). Relative to the abundance of grassland in the surrounding area, the ≈ 2.2 ac of permanent grassland impact due to Project operation is minimal on local and landscape scales.

The Project is not likely to result in jeopardy to the species based on the potential impacts identified above. Should the SCBB become listed as endangered, CCWF2 would reassess whether take could occur based on the final rule and coordinate with the USFWS on whether an incidental take permit and habitat conservation plan may be warranted under Section 10 of the ESA.

3.5.3 Environmental Effects: No Action Alternative

Under the No Action Alternative, no Project-related impacts to threatened or endangered species would occur, but ongoing impacts are expected to continue. For whooping cranes, current threats include collisions with power lines and fences, human pressures on wintering habitat, predators, disease, habitat destruction, and severe weather (USFWS 2024j). For NLEBs, the fungal disease white-nose syndrome is the main threat (USFWS 2024e). For piping plover, habitat loss due to dam construction, water diversion, and water withdrawals have reduced available nesting habitat. Human-caused changes have also increased the number and type of predators, therefore, decreasing nest success and chick survival. Human disturbance, beach

development, and sea level rise have also decreased winter habitat for piping plovers (USFWS 2024f). For rufa red knot, current threats include loss of habitat, disruption of natural predator cycles on breeding grounds, reduced prey availability, and increased frequency and severity of mismatches in the timing of the annual migratory cycle relative to favorable food and weather conditions (USFWS 2021b).

3.6 Air Quality and Climate

This section analyzes potential impacts from the Project on air quality and climate. The general analysis of these resources in Sections 4.4 and 5.4 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for air quality and climate is the CCWF2 Project Area. The Project-specific affected environment and impacts for air quality and climate are analyzed below.

The applicant is committed to implementing conservation measures for air quality and climate derived from Section 5.4.2 of the 2015 PEIS, which minimize impacts to air quality and climate associated with the Project (Appendix A).

3.6.1 Affected Environment

As described in Section 4.4 of the 2015 PEIS, air quality is regulated in the U.S. by the federal Clean Air Act (CAA) under the jurisdiction of the USEPA (40 Code of Federal Regulations [CFR] 50 [1971]). The USEPA sets National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment (USEPA 2022). This includes six criteria pollutants: PM, ozone (O_3), CO, sulfur oxides (SO_X), NO_X, and lead (Pb). Unlike most criteria pollutants, ozone is not emitted directly from fuel combustion, but is synthesized in the atmosphere via a complex web of chemical reactions from ozone precursors, such as non-methane Volatile Organic Compounds (VOCs), NO_X, CO, and atmospheric methane.

Under the CAA NAAQS, the USEPA classifies areas as “attainment,” “nonattainment,” or “maintenance” for the degree of ambient air pollution. Attainment areas are geographic areas that meet or exceed the NAAQS and indicate adequate air quality. Nonattainment areas are areas that do not meet these standards. Maintenance areas are geographic areas that have a history of nonattainment, but now consistently meet the NAAQS (USEPA 2024a). Section 4.4.2.1 of the 2015 PEIS provides existing emissions of the six criteria pollutants for South Dakota.

Separate procedures have been established for federal pre-construction review of certain large, proposed projects in attainment areas versus nonattainment areas. There are currently no criteria pollutant nonattainment areas in South Dakota. Review for affected sources located in attainment areas, called Prevention of Significant Deterioration (PSD)[1], is intended to prevent a new stationary source from causing air quality to deteriorate beyond acceptable levels. During

[1] Prevention of Significant Deterioration thresholds apply to emissions of criteria pollutants from stationary sources.

construction, none of the Project facilities are considered stationary sources, nor would they be large enough, once constructed, to trigger PSD requirements.

Construction activities in general are also expected to generate hazardous air pollutant (HAP) emissions. HAPs are substances known or suspected to cause cancer or other serious health effects, such as reproductive effects, birth defects, or adverse environmental effects. The USEPA currently lists 188 compounds as HAPs, some of which can be emitted from vehicles and construction equipment, such as benzene and formaldehyde.

3.6.1.1 Climate Change and Greenhouse Gas Emissions

According to the USGS National Climate Change viewer, climate change models agree there will be some degree of warming in the CCWF2 Project Area due to climate change (USGS 2021). While emissions from the Project are unlikely to contribute directly to this issue, they would contribute to climate change on a global scale. In addition, the loss of vegetation and soil disruption associated with the development of the Project would also have a small effect on the ability of the local ecosystem to cycle or sequester carbon and modulate atmospheric CO_2 levels.

In the final regulation on GHG permitting, under Section 111(b) of the CAA, the USEPA established standards for emissions of CO_2 for newly constructed, modified, and reconstructed fossil fuel-fired electric utility generating units (USEPA 2015). This regulation considers a source that emits more than 100,000 tons per year (tpy) of CO_2 to be a major source and requires a stationary source that emits more than 25,000 tpy to report their emissions. Because GHG emissions for the construction and decommissioning of the Project are anticipated to be less than reporting minimums and the Project is not a fossil fuel-fired electric utility generator, no additional assessment is required (USEPA 2015). In May 2023, USEPA proposed new CAA emission limits and guidelines based on cost-effective and available control technologies, such as carbon capture. However, these new limits would not apply to the Project as the proposed new limits and guidelines only apply to fossil fuel-fired electric utility generators (USEPA 2023a).

The USEPA also sets GHG emissions standards for on-road and off-road engines. Construction equipment would be operated as needed and the emissions from gasoline and diesel engines would be minimized by engine compliance with the USEPA's mobile-source exhaust standards.

3.6.1.2 Visibility

Class 1 federal lands include areas such as national parks, national wilderness areas, and national monuments. These areas have special air quality protections under Section 162(a) of the federal Clean Air Act. Visibility in Class I areas are protected under two sections of the CAA. Section 165 provides for the PSD program (described above) for new sources. Sources located outside a Class I area may need to obtain a permit to assure there are no adverse impacts on visibility in the Class I area. The USEPA's 1999 Regional Haze Rule set goals to prevent future and remedy existing impairments to visibility in Class I areas. The nearest Class I area, Badlands National Park, is located ≈ 200 mi southwest of the Project and would not be affected.

3.6.1.3 Conformity

A federal agency must make a determination that permitting or approving an activity will conform to the state implementation plan in accordance with 40 CFR Part 93.150 (1993). Transportation and general conformity evaluations are required for the construction phase of wind farms in nonattainment or maintenance areas for the NAAQS. As of 2022, all areas of the state are currently in attainment status with the NAAQS (SDDANR 2024); therefore, no further assessment is required.

3.6.2 Environmental Consequences: Proposed Action Alternative

Impacts to air quality and climate by the Project would be similar to those described in Section 5.4.1 of the 2015 PEIS. The Project could result in both short- and long-term air quality impacts through the release of regulated pollutants into the atmosphere during construction and decommissioning activities. Specifically, vehicle emissions during these activities would affect air quality when travel raises fugitive dust particulate matter (PM_{10} and $PM_{2.5}$) and emits by-products of combustion (CO, SO_X, NO_X, VOC, PM).

Fugitive dust raised by vehicle traffic on unpaved roads and trails contributes to air quality degradation, resulting in a direct hazard to human health. Wind disperses suspended particulates from these disturbance events over long distances, allowing dust raised by vehicle travel to disperse dust-adsorbed contaminants beyond the construction area. Any construction requiring earthwork would disturb soils and result in creation of fugitive dust. New road construction and improvements to existing roads may also result in short-term impacts. Throughout the construction and decommissioning periods, air quality impacts from dust would fluctuate in severity. Dust impacts would be greatest during dry weather but would still be minor in overall severity. Fugitive dust on unpaved roads would be reduced through road watering and other dust-control measures listed in the conservation measures below.

Construction equipment combustion emission of other pollutants would occur during construction and decommissioning of structures and ancillary components. Emissions from paved and unpaved road traffic would occur over a large area, resulting in negligible impacts at any given location.

In all jurisdictions, the Project would not be regulated because it would not emit any criteria pollutants > 100 tpy and is not considered a major Class I source. Modeling for VOCs was not conducted because VOCs are regulated as precursors to other pollutants (O_3, PM_{10}), and are generally modeled only as part of regional applications. Modeling for GHG emissions was also not conducted because there are no ambient standards for GHGs and they contribute to climate change on a global, rather than local or regional, scale.

Emissions of air pollutants and GHGs during operations would result in negligible reduction in air quality given relatively few vehicles would commute to and from the O&M building daily and vehicles accessing the proposed wind generation facilities for maintenance and testing would occur infrequently. Conversely, generating electricity through wind power instead of burning

fossil fuels would have a minor, beneficial impact on air quality at the regional scale by reducing air pollutants and GHG emissions. When operating under the manufacturer's default turbine settings, the Project is designed to generate 312.67 GWh per year, which is enough electricity to power the equivalent of 26, 735 residential homes per year (USEPA 2024b). This offset would reduce GHG emissions by at least 212,743 metric tons (234,510 tons) of CO_2/year by replacing fossil fuel-based electricity production (USEPA 2024c). This reduction would be equivalent to approximately 7.9% of the CO_2 emissions from the electric power industry in 2021 in South Dakota. (EPA 2024a).

To calculate emissions associated with project construction, numbers of personal and medium- or heavy-duty vehicles were estimated both onsite and traveling to and from the site for each month of construction. The South Coast AQMD emission factors for 2025 for on-road passenger vehicles and delivery trucks were then used to calculate total emissions of greenhouse gases from traffic for the entire 9-month construction period (South Coast AQMD 2024; Table3.6-1). This amount was subtracted from the avoided emissions from the remainder of the year (3 months) to get annual emissions for 2026. The GHG emissions after construction reflect the emissions that will be avoided by using energy generated by the wind farm.

Table 3.6-1. Estimated Annual Emissions in Tons from the Campbell County Wind Farm

Year	Avoided Emissions	Produced Emissions	Total Avoided Emissions
2026	53,349	4,232	49,116
2027-2060	213,397	-	213,397

The South Dakota Renewable, Recycled and Conserved Energy Objective (2008; identified in Section 6.2.4 in the 2015 PEIS) required utilities to use at least 10% renewable, recycled, and conserved energy by 2015. Most electricity providers had met that goal, or exceeded it, by 2017, when the final report was issued. South Dakota has not established any standards since the 2008 objective.

Temporary impacts on air quality and climate change from decommissioning would be similar to those for construction. The minor beneficial impacts in reducing GHG emissions by replacing fossil fuels for energy production would be lost unless the Project was replaced or repowered. In 2022, wind climate benefits contributed on average $99/megawatt hour (MWh) and health benefits contributing $37/MWh. When combined with the grid-system value of wind, the total value of wind energy was ≈ $168/MWh (DOE 2023).

3.6.3 Environmental Consequences: No Action Alternative

There would be no direct impacts to air quality, climate change, visibility, and GHG emissions attributed to the construction, O&M, and decommissioning of the Project under the No Action Alternative. Current degradation of air quality and visibility, as well as increased levels of GHG emissions related to climate change from traditional non-renewable energy sources would continue at their current trajectory.

3.7 Socioeconomics

This section analyzes potential impacts from the Project to socioeconomics. The general analysis of these resources in Sections 4.10 and 5.10 of the 2015 PEIS is incorporated herein by reference. The Socioeconomics Analysis Area is defined as Campbell County, South Dakota, with a focus on the CCWF2 Project Area for land use. The Project-specific affected environment and impacts for socioeconomics are analyzed below.

3.7.1 Affected Environment

Section 4.10.1 of the 2015 PEIS provides regional socioeconomic information on employment, unemployment, personal income, sales tax revenues, individual income tax revenues, population, vacant rental houses, state and local government expenditures, state and local government employment, and recreation. Recent measures of economic development applicable to the CCWF2 Project Area are provided in Table 3.7-1. Data are reported for Campbell County and South Dakota for the most recent year available. South Dakota does not currently have a state income tax; therefore, this measure is not reported. Campbell County household income and poverty levels are similar to state levels. Rental vacancies and unemployment rates are higher than the state average, which indicates additional hiring resulting from the Project could be absorbed within the county.

The CCWF2 Project Area is in a rural area ≈ 100 mi north of Pierre, South Dakota, near the Missouri River. All land in the CCWF2 Project Area is privately owned. Most community facilities and services near the CCWF2 Project Area are in the towns of Mound City or Herreid, which are ≈ five mi east and ≈ 10 mi northeast of the CCWF2 Project Area, respectively. In 2020, Mound City had an estimated population of 69 and Herreid had a population of 416 (U.S. Census Bureau 2024b). Herreid has a community center/skate park, swimming pool, fire hall, grocery store, a health clinic, places of worship, parks, and schools, but police services are provided by the County Sheriff's Department. Mobridge, ≈ 25 mi southwest, provides larger social services and amenities, such as a hospital, a high school, and a municipal airport.

Table 3.7-1. Key measures of economic development within Campbell County.

Economic Development Measures (Year)	Campbell County (SD)	SD
Population (2022)[a]	1,349	909,824
Annual Median Household Income (2021)[a]	$58,206	$63,900
Percent of Population considered Minority (2022)[a]	4.2	18.4
Percent of Population Below Poverty (2022)[a]	10.9	12.3
Rental vacancy rate (2019)[b]	31.88%	6.93%
Unemployment rate (2021)[c]	2.4%	1.8%
State and local government expenditures (2020)[d]	N/A	$1,716,775,467
State and Local Sales Tax Revenue: Tourism (2020)[e]	N/A	$18,250,643

Economic Development Measures (Year)	Campbell County (SD)	SD
Total State Tax Revenue[e] (Fiscal Year 2022 Sales, Use, and Excise Taxes)	N/A	$1,623,878,853 (2022)

N/A = not available.

a. U.S. Census Bureau 2024b.

b. Department of Numbers 2021.

c. U.S. Bureau of Labor and Statistics 2024.

d. State of South Dakota 2019.

e. South Dakota Department of Revenue 2022.

In 2021, Campbell County had an estimated 929 employed people out of 1,349 residents. The largest industries by employment were farming (336 people), government (148 people), and other services (128 people; Headwaters Economics 2023).

The entire CCWF2 Project Area is zoned A-Agricultural District. Small parcels of State of South Dakota School and Public Lands (State Land Board) land are near, but not directly adjacent to, the CCWF2 Project Area. Shaw Creek Recreation Area, also near the CCWF2 Project Area, is managed by the SDGFP and offers a boat ramp accessing Lake Oahe/Missouri River.

3.7.2 Environmental Consequences: Proposed Action Alternative

Section 5.10 of the 2015 PEIS describes the general direct and indirect economic impacts from the construction and operation of wind energy facilities in the UGP. Direct impacts occur because of expenditures of wages and salaries, procurement of goods and services, and sales tax. Indirect impacts occur as Project wages, salaries, and procurement expenditures subsequently circulate through the economy, creating additional employment, income, and tax revenue. Other impacts discussed include potential impacts to local recreation and property values. Potential economic impacts of the construction of new transmission lines associated with wind energy developments are discussed in Section 5.10.1.4 of the 2015 PEIS.

Under the Proposed Action Alternative, the number of Project-related short-term construction jobs created is expected to be approximately 165 construction worker jobs plus 12 inspection staff and 25 engineers for commissioning and SCADA over an estimated 8-month peak construction period. Construction of the Project would require skilled labor, such as foremen, crane operators, iron workers, electricians, millwrights, and heavy equipment operators, as well as unskilled laborers. This diverse workforce would be necessary to install the Project components, such as the wind towers and turbines, access roads, underground collection lines, and substation. The estimated number of construction jobs by classification and annual employment expenditures during construction are included in Table 3.7-2. The annual salary of construction workers is expected to be above the Campbell County median household income (Table 3.7-1). Since the construction jobs are temporary, the Project is not expected to result in a material impact on median household income in Campbell County.

Table 3.7-2. Anticipated construction jobs and employment expenditures.

Job Classification	Number of Jobs	Estimated Annual Salary Range
Crane operators	7	$90,000 – $150,000
Civil workers	31	$75,000 – $100,000
Construction workers	35	$60,000 – $90,000
Collection workers	9	$70,000 – $100,000
Tower erectors	44	$60,000 – $90,000
Substation workers	13	$70,000 – $100,000
Foundation workers	26	$60,000 – $90,000
Testing and inspection staff	12	$70,000 – $100,000
Design engineers	15	$90,000 – $150,000
Total	**191**	**$12,985,000 – $19,250,000**

It is anticipated that sufficient general skilled labor is available in Campbell County or South Dakota to serve the basic infrastructure and site development needs of the Project. Specialized labor would be required for certain components of Project construction, which may be sourced from other areas in the region. During construction, non-local workers could need temporary housing and the vacancy rate of rental properties in the commuting radius of the Project could be reduced. However, anecdotal evidence indicates that some construction workers would likely provide their own housing in recreational vehicle trailers in local campsites, as available. If needed, temporary housing for workers would include available facilities in several towns throughout the area. This may be needed given that closer towns are very small and commuting to towns with available lodging would be cumbersome. The Project is not expected to have a negative effect on the economics of rental properties and could have a short-term positive effect due to increased demand for local services and materials. Local businesses that would be anticipated to potentially benefit economically from increased demand may include service industries (e.g., restaurants, grocery stores, hotels, and gas stations) and other construction material supply businesses.

There could be negative effects, such as increased road maintenance costs due to construction traffic. The applicant is currently negotiating a road use agreement with Campbell County to address these concerns. The road maintenance agreement would be completed as the Project obtains a county Conditional Use Permit from Campbell County. The road maintenance agreement would identify ways to minimize and mitigate potential impacts to area transportation infrastructure prior to, during, and after construction.

Operation of the Project could create direct long-term effects for landowners in and adjacent to the CCWF2 Project Area, Project employees, and the Campbell County tax bases (Table 3.7-3). The Project is projected to generate approximately $426,900 annually, on average over the 35-year operating lifespan, in production taxes. Of these production taxes, approximately $104,900 is expected to be provided to the state, and $161,000 each to both Campbell County and School Districts (South Dakota Department of Revenue 2022). These revenues could be used to improve local government or community services, benefiting all residents. Local

spending from long-term staff employed at the Project during operation would result in additional business income, as well as increased state and local tax revenue. Private landowners who participate in the Project would receive the most direct economic benefit from easement payments for wind turbines and roads located on their properties. These payments would provide a predictable supplemental source of income for the life of the Project, which is expected to be 35 years.

Table 3.7-3. Direct economic benefits from the Project.

Payment	Direct Beneficiary	Approximate Annual Total
Wind lease payments	Project landowners	$100,000 - $135,000
Operations and maintenance	≈ 6 to 8 employees	$615,000
Taxes	School districts, Campbell County, and South Dakota	$426,900

The Project would generate six to eight long-term operation jobs for the first 10 years of commercial operation, which could have a positive effect on local income levels. These long-term positions could bring additional people to Campbell County and positively contribute to the local economy. Long-term positions include a site supervisor, lead technician, and four to six wind turbine technicians.

The estimated number of jobs by classification and annual employment expenditures during operation are shown in Table 3.7-4. While the salary of some of the workers is likely to be greater than the median household income in Campbell County, the small number of workers would not have a substantial effect on overall county median household income. Similarly, this small number of workers would not be expected to affect long-term rental vacancy levels.

Table 3.7-4 Anticipated operation jobs and employment expenditures.

Job Classification	Number of Personnel[a]	Estimated Annual Salary[a]
Site Supervisor	1	$100,000 – 135,000
Lead Technician	1	$90,000 – $115,000
Wind Turbine Technicians	4 – 6	$50,000 – $95,000
Total	**6 – 8**	**$390,000 – $820,000**

a. For the first 10 years of commercial operation, in 1-year intervals.

Section 5.10.1.2 of the 2015 PEIS notes that estimating the impact of wind facilities on recreation is problematic, as it is not clear how wind development impacts recreational visitation and nonmarket values. The Project occurs entirely on private property, where recreational use (including hunting) would primarily be by landowners, their families, and invited guests. Livestock grazing and dry land farming would still be allowed in portions of the Analysis Area.

Section 5.10.1.3 of the 2015 PEIS discusses several studies that assessed the potential impacts of wind projects on property values due to deterioration in aesthetic quality, increases in noise, real or perceived health effects, and traffic congestion. Several comments received during scoping also raised concerns regarding loss in property values and a multi-generational effect in

such property value lost. The analysis below includes additional peer-reviewed studies, some more recent than the 2015 PEIS.

A survey of county tax assessors was conducted in 13 locations with recent, multiple-turbine wind developments. While not all locations had wind turbines visible from residential areas and others had been constructed too recently for the full impact to be properly assessed, the study found no evidence that wind turbines decreased property values (ECONorthwest 2002). In one area, designation of land parcels for wind development increased property values (ECONorthwest 2002). Multiple studies have looked at influences on change in property value. Results summarized that neither the view of the wind facilities nor the distance of the home to those facilities had a statistically significant effect on sales prices (Hoen et al. 2011). For most wind projects, property values tended to increase faster in areas with a view of wind turbines than in areas with no wind energy generation projects.

The Lawrence Berkeley National Laboratory conducted research regarding utility-scale wind energy development's property value effects (Hoen et al. 2011, 2013). The Lawrence Berkeley National Laboratory authors collected data on almost 7,500 sales of single-family homes within 10 mi of 24 existing wind facilities in nine states. The analysis found that if property value impacts exist, they are too small or too infrequent to result in any widespread, statistically observable impact. The possibility, however, that individual homes or small numbers of homes have been or could be negatively impacted was not dismissible.

Another study also found "no unique impact on the rate of home sales near wind turbines." The study did find a negative impact to property values near other infrastructure, such as major roads and electrical transmission lines (Hoen and Atkinson-Palombo 2016).

A U.S.-wide assessment of costs due to visibility impacts was recently conducted using perceived turbine visibility data and home values since 1997 (Guo et al. 2024). The study found wind turbine visibility negatively affects average home values in an economically and statistically significant way for those in close proximity (5 mi). However, the effect diminishes over time and in distance and is indistinguishable from zero. Data showed that only houses within 1.2 mi of a turbine saw their value significantly affected, at up to 8%. Beyond 1.2 mi, the impact rapidly tailed off. It was determined the reduction in value a property experiences peaks ≈ three years after turbine installation and then becomes smaller the more years pass (Guo et al. 2024). Specifically, while an average wind turbine installed in 2011 has a negative effect on nearby property values, the effect becomes indistinguishable from zero for turbines installed after 2017. The study perceived these results as function of people get used to new structures in their environment over time (Guo et al. 2024).

A study conducted by the DOE found impacts to property values within ≈ one mi of a wind turbine begin ≈ three years before project construction starts, and values continue declining through project construction. Property values return to inflation-adjusted pre-announcement levels three to five years after project operation commences (Brunner et al. 2024).

While short-term, moderate impacts to property values may be experienced in the years following and preceding construction of the Project, depending on the property's proximity and turbine visibility, long-term impacts would diminish over time to be minor.

3.7.3 Environmental Consequences: No Action Alternative

No Project-related adverse or beneficial impacts to socioeconomics would occur under the No Action Alternative. Socioeconomic conditions in Campbell County would continue based on existing socioeconomic activities and trends.

3.8 Transportation and Aviation

This section analyzes potential impacts from the Project to transportation and aviation. The general analysis of these resources in Sections 3.10, 4.1.3.2 and 4.1.3.4 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for each resource is defined below. The Project-specific affected environment and impacts for transportation and aviation are analyzed below.

CCWF2 is committed to implementing conservation measures for transportation and aviation derived from coordination with Campbell County, Section 5.1.2 of the 2015 PEIS, and according to easement stipulations, to minimize transportation and aviation impacts associated with the Project (see Appendix A).

3.8.1 Affected Environment

3.8.1.1 Ground Transportation

The Analysis Area for ground transportation includes roads to be used by construction vehicles, construction workers, and operational vehicles during the life of the Project (Figure 3.9-1). Table 3.9-1 presents the roads, by type, around the Analysis Area that could be used for construction and operation. The primary access for the Project would be on rural roads originating from South Dakota Highway 1804 and U.S. Highway 83. In 2022, an average of 68,804 mi was traveled by all vehicle types daily in Campbell County, most on state and local highways (South Dakota Department of Transportation [SDDOT] 2023). Campbell County is currently responsible for maintenance of the public roads in and around the CCWF2 Project Area (SDDOT 2023). All existing private roads in the CCWF2 Project Area are maintained by property owners or left unmaintained.

Table 3.9-1. Existing roads within the CCWF2 Project Area.

Road	Surface Type	Surface Width (feet)	Number of Lanes	Length (miles)
300 Avenue (AVE)	Gravel or Crushed Rock	16	2	0.23
300 AVE	Graded & Drained Earth	14	1	0.50
302 AVE	Primitive (Trail)	10	1	0.53
113 Street (ST)	Primitive (Trail)	10	1	1.00
109 ST	Gravel or Crushed Rock	26	2	0.54

Road	Surface Type	Surface Width (feet)	Number of Lanes	Length (miles)
110 ST	Graded & Drained Earth	20	2	0.98
112 ST	Gravel or Crushed Rock	26	2	0.93
109 ST	Gravel or Crushed Rock	26	2	0.04
115 ST	Unimproved	12	1	0.47
300 AVE	Primitive (Trail)	10	1	1.99
301 AVE	Gravel or Crushed Rock	20	2	0.17
301 AVE	Gravel or Crushed Rock	20	2	2.00
111 ST	Primitive (Trail)	10	1	0.97
301 AVE	Gravel or Crushed Rock	20	2	0.00
114 ST	Primitive (Trail)	10	1	0.78
299 AVE	Primitive (Trail)	10	1	0.91
109 ST	Gravel or Crushed Rock	26	2	0.59
300 AVE	Primitive (Trail)	10	1	0.23
296 AVE	Gravel or Crushed Rock	26	2	0.36
110 ST	Graded & Drained Earth	20	2	0.50
112 ST	Gravel or Crushed Rock	26	2	0.00
301 AVE	Gravel or Crushed Rock	20	2	0.72
296 AVE	Gravel or Crushed Rock	26	2	0.03
116 ST	Primitive (Trail)	10	1	0.39
112 ST	Gravel or Crushed Rock	26	2	0.72
302 AVE	Gravel or Crushed Rock	22	2	0.49
115 ST	Primitive (Trail)	10	1	0.16
295 AVE	Gravel or Crushed Rock	22	2	0.96
300 AVE	Gravel or Crushed Rock	16	2	0.31
113 ST	Primitive (Trail)	10	1	0.45
302 AVE	Primitive (Trail)	10	1	0.36
301 AVE	Gravel or Crushed Rock	26	2	0.53
115 ST	Gravel or Crushed Rock	26	2	0.40

Source: South Dakota Department of Transportation (2023).

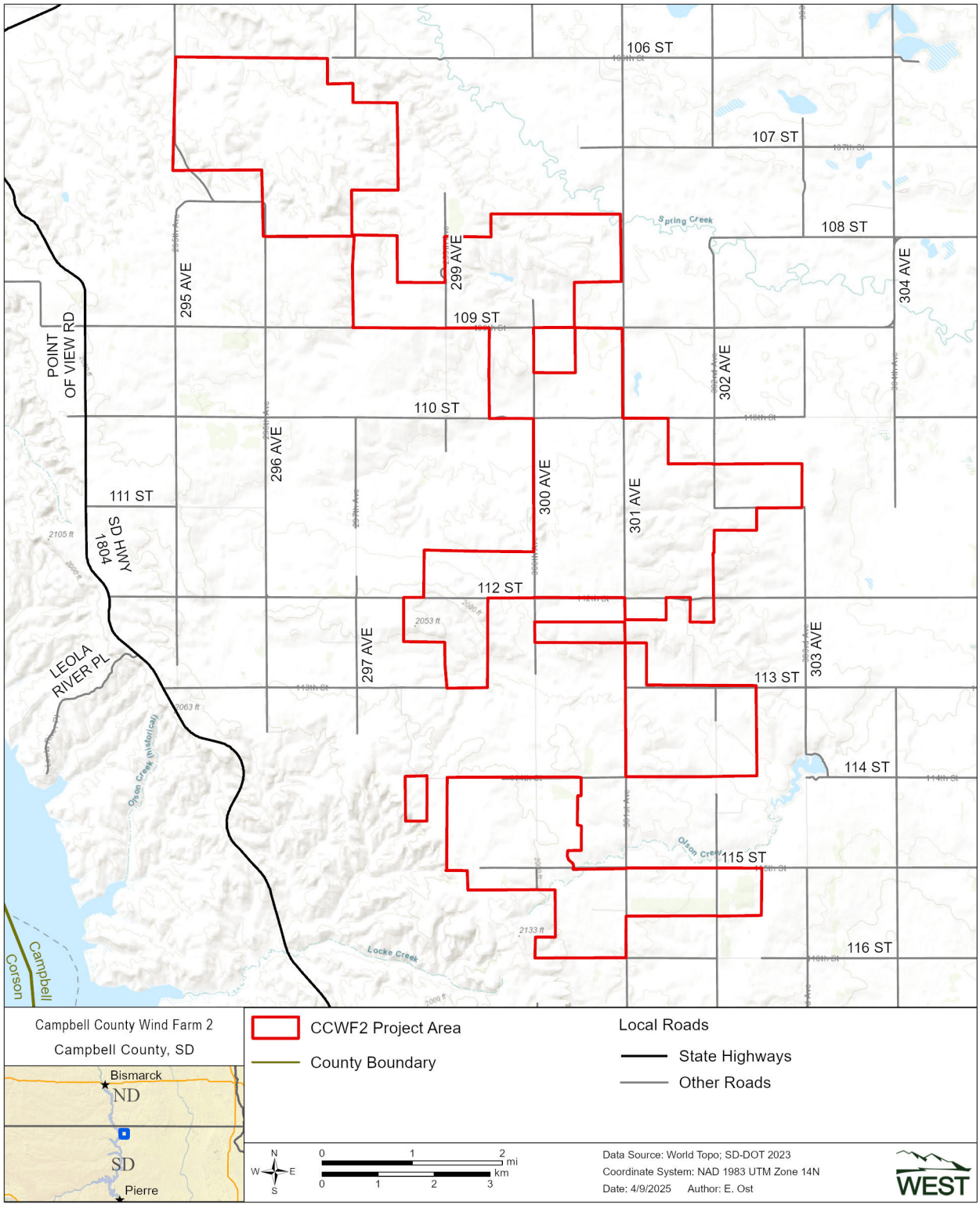

Figure 3.9-1. Ground transportation infrastructure within the CCWF2 Project Area.

3.8.1.2 Aviation

The Analysis Area for aviation includes airports serving aircraft that may fly over the Project while traveling to local airports. There are three airports near the CCWF2 Project Area: Herreid Municipal Airport, Brockel Airstrip (private airstrip), and Moser Airstrip Airport-NA54 (private airstrip; USGS 2024b). Herreid Municipal Airport is the closest airport, ≈ 10 mi from the CCWF2 Project Area. Primary flight paths from the airports around the CCWF2 Project Area would likely be aircraft conducting local agricultural spraying, aerial inspection of existing electrical transmission infrastructure, and private plane travel. There are no commercial airports ≤ 100 mi of the Analysis Area. The nearest commercial airports are the Aberdeen Regional Airport and Pierre Regional Airport, both ≈ 110 mi from the CCWF2 Project Area. Passenger flights are expected to exceed the height of the wind turbines, as the FAA requires aircraft maintain a minimum altitude ≥ 500 ft or not operate an aircraft < 500 ft of any person, vehicle, or structure (14 CFR § 91.119 [1989]). The nearest Airforce base is 178 mi from the Analysis Area, with assumed no training paths near the Analysis Area (USGS 2024b).

3.8.1.3 Emergency Services

There are two volunteer fire departments near the CCWF2 Project Area: Herreid Volunteer Fire Department and Mound City Volunteer Fire Department (USGS 2024b). Both are ≈ five to seven mi from the CCWF2 Project Area. The nearest hospital is Mobridge Regional Hospital and Clinic, in Mobridge, South Dakota, ≈ 20 mi from the CCWF2 Project Area.

3.8.2 Environmental Consequences: Proposed Action Alternative

Section 4.1.3 of the 2015 PEIS describes general direct and indirect impacts from aviation and ground transportation to the construction and operation of wind energy facilities in the UGP.

3.8.2.1 Ground Transportation

County roads, ≈ 19 mi, are expected to be improved to deliver construction equipment and aid in transportation of workers to proposed construction areas. The Project includes construction of 10.3 mi of additional private roads to support the construction and operation of the wind farm. These roads would be on private property and maintained by the applicant for turbine and other infrastructure maintenance access. To mitigate the degradation caused by large and over-sized vehicle traffic for the construction of the Project, a road maintenance agreement and plan would be established with Campbell County. The road maintenance agreement would be drafted to not cause undue burden to the surrounding properties and the county road system. In addition, CCWF2 would provide temporary widening of public and new access roads to accommodate movement of large and over-sized vehicles to construct the Project. CCWF2 would mitigate any adverse impacts caused by higher vehicle traffic by adding a gravel cap, creating proper drainages with widening roads, and applying appropriate treatments to roads to minimize dust. For cross-country movement and heavy vehicle movement, CCWF2 would use measures such as cribbing, bedding, and/or mats to minimize impacts these vehicles have on temporary construction footprints and to limit any long-term effects on road conditions. There

would likely be overall improvements to local roads to accommodate construction and operation of the Project. Improvements could include adding gravel, widening, and repairing potholes.

For delivery of wind turbines, travel plans would be discussed with county, state, and federal transportation departments. These plans would establish routes from factories to the CCWF2 Project Area via routes with the least impact on local traffic and reduce hazard crossings (e.g., low bridge, low power lines, and overweight crossings).

3.8.2.2 Aviation

CCWF2 would conduct outreach to county, state, and federal governments regarding adjusted FAA flight paths and effects to local field spraying contractors. Wind turbines would likely affect the flight paths of small, local planes and agricultural field crop dusting planes. CCWF2 would follow FAA regulations for marking towers and implementing necessary safety lighting. An ADLS to trigger turbine lights when aircraft are detected near Project turbines would be installed, pending a review by the FAA, to minimize light impacts at night. CCWF2 would submit a Notice of Proposed Construction or Alteration with the FAA, for all proposed and potential turbine locations, and coordinate potential hazards with the FAA, as appropriate.

CCWF2, in accordance with WAPA, would conduct public outreach to neighboring properties to recommend routes around the Project and minimize disturbance to local traffic and the environment. While adjusted flight paths could affect aviation, with the lighting measures and outreach committed to by CCWF2, long-term impacts to aviation would be minor.

3.8.2.3 Emergency Services

Regarding emergency response routes, CCWF2 would conduct outreach to local emergency departments, including Herreid Volunteer Fire Department and Mound City Volunteer Fire Department. The outreach would allow an understanding of traffic pattern effects on existing response plans to minimize effects on the quick response of first responders to emergencies.

3.8.3 Environmental Consequences: No Action Alternative

Potential effects to transportation and aviation resources would not occur under the No Action Alternative. Existing transportation and aviation activities, including spray applications for agriculture, would continue. Existing road widths and material would remain the same, with road conditions maintained by the county and no additional new private roads or access points created. Traffic patterns would remain the same along county and state roads.

3.9 Noise

This section analyzes potential noise impacts from the Project. In the 2015 PEIS, noise is analyzed in Sections 4.5.1, 4.5.2, and 5.5; an explanation of noise acoustics and typical noise impacts of a wind energy facility are incorporated herein by reference. The Project-specific affected environment and impacts are analyzed below.

CCWF2 is committed to implementing applicable conservation measures for noise derived from Section 5.5.2 of the 2015 PEIS to minimize noise impacts associated with the Project (see Appendix A).

3.9.1 Affected Environment

The Project is in rural Campbell County, which is mainly agriculture and herbaceous land, with rural residences scattered throughout. The landscape is mostly open, with scattered trees occurring primarily in riparian areas and as landscaping or shelterbelts on farms. The topography in the CCWF2 Project Area varies from relatively flat in the northern and eastern portions to rolling uplands to the west and south, particularly as the landscape approaches Lake Oahe and the Missouri River.

No baseline assessment of existing sound sources has been completed for the Project to date. Farming activities, vehicle traffic, and wind are assumed to be the largest contributors to sound. Generally, background noise levels in rural areas are 35 to 40 A-weighted decibels (dBA; USEPA 1974). Existing ambient sound levels are expected to be relatively low, although sound levels would be higher near roadways. Other human activities, such as agricultural operations and hunting, would seasonally contribute to sound levels in the area associated with crop harvests, livestock handling, and gunshots. The Project is in a relatively windy region of South Dakota, with an average annual wind speed of 7.0 to 8.5 m/s (15 to 19 mph; WINDExchange 2024a). Typically, background sound levels are quieter during the night than during the day (Wyle Laboratories 1971).

A human's perception of sound can be measured in dBA, which are representative of the human ear's response to sound. Unwanted or offensive sound is often called noise. The sound pressure levels (in dBA) of some common sound sources are provided in Table 3.10-1.

In addition to generally audible noise in the environment (typically, frequencies of 20 to 20,000 Hertz), infrasound (sound with frequencies in the range of one to < 20 Hertz) is common in the U.S. Infrasound is created from natural sources, such as wind and any other natural motions resulting in slow oscillations of air, as well as man-made sources, such as wind turbines, cars, industrial machinery, slow-moving fans, and household appliances (Leventhall 2003, 2006). Infrasound is generally not audible. However, infrasound can be audible at very high levels (110+ dBA) and these sounds may occur from man-made sources or from natural sources, such as avalanches, ocean waves, meteors, or volcanic eruptions (Bedard 1999).

Table 3.10-1. Typical sound pressure levels associated with common noise sources.

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 feet (ft)	–
130	Pain threshold	Jet aircraft during takeoff at 300 ft	–
120	Feeling threshold	Elevated train	Hard rock band
110	–	Jet flyover at 1,000 ft	Inside propeller plane

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
100	Very loud	Power mower, motorcycle at 25 ft, automobile horn at 10 ft, crowd noise at football game	–
90	–	Propeller plane flyover at 1,000 ft, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 miles per hour) at 50 ft	Inside an automobile at high speed, garbage disposal
70	Loud	B-757 aircraft cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 ft, near highway traffic	General office
50	Quiet	–	Private office
40	–	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (w/o television and stereo)
20	–	Rustling leaves	Quiet theater, whisper
10	Just audible	–	Human breathing
0	Hearing threshold	–	–

dBA = A-weighted decibels.
Sources: Adapted from Egan 1988, Ramsey et al. 1994.

Sensitive sound receptors generally include occupied residences and areas where people congregate, such as churches, schools, and community centers. Sensitive sound receptors are found in several communities located near the Project. The closest are Pollock and Mound City, each ≈ three mi from the CCWF2 Project Area. Mobridge is 4.1 mi away.

Campbell County's Zoning Ordinance prohibits noise levels produced by wind projects exceeding 45 dBA at existing off-site residences, businesses, and buildings. CCWF2 has conducted a noise assessment for the Project that models and evaluates the expected noise levels due to Project-related activities at these sensitive receptors.

A Noise Assessment conducted for the Project modeled sound levels at 251 total receptors, including structures < 6,000 m from the Project (RSG 2024; Appendix H). This included residences, barns and sheds, and other unoccupied structures. Many of these receptors have existing noise levels due to Campbell County Wind Farm 1, located adjacent to the Project. Sound levels from Campbell County Wind Farm 1 alone are above 45 dBA for several receptors, with the highest of 53 dBA at one receptor. Campbell County Wind Farm 1 was permitted before the Campbell County Zoning Ordinance was in place. The addition of the Project would increase modeled noise at one receptor from 50.4 dBA to 50.6 dBA (Appendix H). The highest sound level for participating structures was 48 dBA, found at five structures (Appendix H). Campbell County's Zoning Ordinance of 45 dBA only applies to nonparticipating receptors.

3.9.2 Environmental Consequences: Proposed Action Alternative

Section 5.5 of the 2015 PEIS describes common noise impacts associated with the construction, operation and maintenance, and decommissioning of a commercial wind energy project. These impacts would apply to the Project.

Construction of the Project may cause short-term, unavoidable noise impacts. Sound levels would vary depending on type and age of equipment, specific manufacturer and model, operations being performed, and condition of equipment and exhaust system mufflers. Noise generated by construction would occur intermittently, depending on the phase of construction, and equipment in use at a given time and location. Construction activity would generate traffic, such as trucks travelling to and from the site on public roads, which would cause noise effects.

Most construction activities would occur during the day when higher background sounds would attenuate construction-related noise. However, concrete foundation work and turbine erection work could extend into overnight hours depending on weather and timing of concrete pours, which must be continuous. As noted in the 2015 PEIS, when background noise levels exceed noise emitted from a particular source by ≈ six dBA, the source would not contribute to a perceptible noise increase. Based on typical noise attenuation distances, equipment noise would be expected to attenuate to background noise levels on windy days at ≈ 328 to 1,640 ft, or ≈ 1,000 to 2,000 ft on calm days (Bureau of Land Management [BLM] 2011). Impacts to noise from construction are expected to be minor.

During operation, the Project's wind turbines and substation would be a long-term source of audible sound. Sound generated by an operating wind turbine is comprised of both aerodynamic and mechanical sound, with the main sound component being aerodynamic. Aerodynamic noise results from air flowing across and around each blade of the turbine and mechanical sound is generated by machinery inside the hub of the turbine, such as gearboxes, motors, cooling systems, and pumps. Substations have switching, protection, and control equipment and typically one or more transformers, which generate a sound generally described as a low humming. As discussed in the 2015 PEIS, noise levels from a substation would generally attenuate to < 40 dBA at 2,000 ft, or within six dBA of background noise levels of a rural area under calm winds.

The maximum value of sound at any nonparticipating receptor is predicted to be at or below 52 dBA, with most receptors < 40 dBA. Noise from Project wind turbines would be near background noise levels for this area (30 to 50 dBA) (Appendix H). Given the area often experiences windy conditions, which increase background noise levels, it is expected an increase in audible noise levels at receptors due to turbines would be negligible to minor for this Project. Since noise levels would increase above 45 dBA at receptors not participating in the Project, CCWF2 received a variance from the Campbell County Board of Commissioners addressing the increase.

Wind turbines can generate infrasound from the rotation of turbine blades. Infrasound levels from contemporary wind turbines are lower than those shown to cause harm (Roberts 2018).

Human health effects sometimes attributed to wind farm noise and infrasound include sleep disturbance, vertigo, and stress. Reliable evidence has not provided a link between infrasound and these adverse health effects. An independent expert panel for Massachusetts (Ellenbogen et al. 2012) found insufficient evidence that noise from wind turbines is directly causing human health effects. While studies have not reliably shown wind farms cause direct health effects, perceptions of wind farms have been correlated with health effects, such as sleep disturbance (Ellenbogen et al. 2012). Because infrasound has many sources and can travel efficiently over long distances, its effects on human health have been extensively studied. Expert testimony filed before the South Dakota Public Utilities Commission found peer-reviewed, published scientific research has not demonstrated a link between infrasound from wind turbines and adverse health effects, including sleep disturbance or vertigo (Roberts 2018).

During decommissioning, noise level impacts would be temporary and minor, similar to those used for construction, but on a more limited scale and for a shorter duration.

3.9.3 Environmental Consequences: No Action Alternative

The No Action Alternative would have no Project-related impacts on noise levels in the area. Existing activities, primarily farming and vehicle noise, would continue.

3.10 Visual Resources and Shadow Flicker

This section analyzes potential impacts from the Project to visual resources. The general analysis of these resources in Sections 4.7 and 5.7 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for visual resources is a 30-mile radius of the proposed wind turbines, which is considered the outer limit of visual effects under normal circumstances (Sullivan et al. 2012). The Project-specific affected environment and impacts for visual resources are analyzed below.

CCWF2 is committed to implementing the applicable conservation measures for visual impacts derived from Section 5.7.1.3 of the 2015 PEIS, to minimize visual impacts associated with the Project (see Appendix A).

3.10.1 Affected Environment

The CCWF2 Project Area is in a landscape of gently rolling hills, rangeland, and cropland. Visibility is considered very high and visual absorption capacity, a landscape's susceptibility to visual change from human development, is comparatively low in the Analysis Area due to the relatively flat to rolling terrain and the uniformity of relatively low-growing vegetation in the region. Exceptions are the Missouri River basins and tributaries leading into the Missouri River.

Campbell County Wind Farm 1 and existing lattice transmission line towers are in the Project viewshed, ≈ four mi to the west. The primary viewing locations where the Project would be visible are U.S. Highway 83, South Dakota Highway 10, South Dakota Highway 1804, the Towns of Herreid and Pollock, and Pollock Recreation Areas. Outside of these locations, population density is very low.

Where visible, the degree of impact is influenced first by distance from the nearest turbine and then by the combination of viewer sensitivity, number of viewers, and baseline visual quality. Where one of the viewers' sensitivities, number of viewers, or visual qualities is high in the first 10 mi, the degree of impact is high. Where one of the viewers' sensitivities, number of viewers, or visual qualities is moderate in 10 to 20 mi, the degree of impact is moderate, and so on. Table 3.11-1 presents information on criteria used to assess potential visual impacts.

- *Viewer Sensitivity*: an estimated high, medium, or low in professional opinion by analyzing various indicators of public concern: Type of Users, Public Interest, Adjacent Land Uses, Special Designations or Special Areas. Adapted from BLM Visual Resource Inventory Handbook 8410.
- *Viewer Number*: the number of potential viewers as indicated by Municipalities = High; State Highways = Moderate; County Roads = Low.
- *Visual Quality*: an estimated high, medium, or low by professional opinion based on field investigations considering seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.
- *Distance from Nearest Turbine*: see Figure 3.11-1 and supporting analysis from *Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes* (Sullivan et al. 2012.)

Table 3.11-1. Visual impact assessment criteria.

Viewer Sensitivity - Special Designation	Viewer Number	Visual Quality	Distance from Nearest Turbine	Degree of Impact (High, Moderate, Low, Negligible)
High	High	High	0-10 miles	**High**, major focus of visual attention
Moderate	Moderate	Moderate	10-20 miles	**Moderate**, unlikely to be missed by a casual observer
Low	Low	Low	20-30 miles	**Low**, visible when scanning
Low	Low	Low	>30 miles	**Negligible**

Table 3.11-2 describes the characteristics of seven representative key observation points (KOPs) or public viewing locations from stationary points (e.g., recreational site or town) or linear locations (e.g., highway) to document the representative overall degree of impact.

Table 3.11-2. Key observation points within the Project viewshed.

KOP Number - Name	Viewer Sensitivity - Special Designation (High, Moderate, Low)	# of Viewers (High, Moderate, Low)	Visual Quality (High, Moderate, Low)	Distance to Turbine (miles)	Degree of Impact (High, Moderate, Low, Negligible)
1. Town of Herried	High – Populated Area	High	High	4	High – < 10 mi to turbines
2. Sand Lake State Game Refuge	Low – None	Low	High	8	High – < 10 mi to turbines
3. Pocase National Wildlife Refuge	Low – None	Low	High	7	High - < 10 mi to turbines

KOP Number - Name	Viewer Sensitivity - Special Designation (High, Moderate, Low)	# of Viewers (High, Moderate, Low)	Visual Quality (High, Moderate, Low)	Distance to Turbine (miles)	Degree of Impact (High, Moderate, Low, Negligible)
4. Pollock Recreation Area	Moderate – Recreation Area	Moderate	High	6	High - < 10 mi to turbines
5. West Pollock Recreation Area	Moderate – Recreation Area	Moderate	High	7	High - < 10 mi to turbines
6. Native American Scenic Byway	High – Scenic Byway	High	High	12	Moderate – > 10 mi to closest turbine
7. Mound City	Moderate – Intermittent Visibility	Moderate	High	4	High - < 10 mi to turbines

Viewer sensitivity, or the estimated level of public concern to noticeable visual changes to the landscape, varies widely. Local public scoping comments and national preference studies indicate strong attitudes both for and against wind energy on account of visual effects (Hoen et al. 2019, Gross 2020). Viewer sensitivity is higher in recreation areas listed in Table 3.11-2 and larger populations near the town of Herried. The areas to the east, south, and west are dispersedly populated, indicating lower visual sensitivity.

3.10.2 Environmental Consequences: Proposed Action Alternative

Common visual impacts of wind energy projects occur in response to site construction, operation, and decommissioning activities and are further described in Section 5.7.1 of the 2015 PEIS. Project-specific impacts for each phase of the Project are described below.

The proposed wind turbines would change the aesthetics of the landscape with the addition of tall, white towers, rotating blades, and red blinking lights at night. The substation, access roads, gen-tie line, O&M building, MET towers, and vehicles would also be visible in the Analysis Area to varying degrees. Various factors can influence the degree of contrast that a project can have on the landscape and on viewer response. Factors accounted for in the impact evaluation (BLM 1986) include:

- Distance: the farther away the facilities are, the less contrast the structures have.
- Angle of Observation: viewing a project from different angles, such as from above or below, can affect the apparent size of a project and the resulting level of contrast.
- Length of Time in View: the longer a project is in view, the more contrast created.
- Relative Size or Scale: contrast created by a project is directly related to its size and scale compared to the surrounding landscape.
- Lighting Conditions: the direction and angle of the sun affects the color, intensity, shadow, reflection, form, and texture of visual aspects on a landscape.
- Motion: movement (i.e., spinning wind turbine blades) draws attention and increases contrast.

Construction activities could result in visual impacts from vegetation clearing and grading; road building/upgrading; construction and use of staging and laydown areas; construction of facilities; vehicular, equipment, and worker presence and activity; dust; and emissions. Because of the large size of wind turbine towers, blades, and other components, the transport and installation of wind turbines and associated dust clouds would be visually conspicuous activities. Large, and in some cases unusual, vehicles are required to transport some components and the sight of these components on local roads would be memorable. In general, construction visual impacts would vary in frequency and duration throughout the course of construction. There would be periods of comparatively intense activity followed by periods with less activity. Associated visual impacts would vary according to construction activity levels. Site monitoring, adherence to standard construction practices, and restoration activities would reduce many of these potential visual construction impacts.

Visual impacts during decommissioning would be similar to construction impacts; however, decommissioning impacts would be of lesser magnitude and limited to ≈ six months.

The main direct visual impacts associated with operation of the Project would result from the introduction of vertical lines of the ≤ 29 wind turbines into the generally horizontal landscape found in the Analysis Area. Shadow flicker, blade glinting, and lights on Project facilities would also result in visual impacts. The magnitude of impacts from a wind turbine is largely proportional to distance. A conservative analysis suggests, to the unaided eye and under optimal viewing conditions, wind turbines would be discernible beyond the 30-mi radius analysis area, though the impact would be considered negligible at this distance. Wind turbine blade movement would be visible and unlikely to be missed by casual observers in ≤ 20 mi. Wind turbines would be a major focus of visual attention and begin to dominate the visual experience at ≤ 10 to 12 mi (Sullivan et. al. 2012). These distances are highlighted on the Project wind turbine viewshed map (Figure 3.11-1), with visibility screened in some locations by topography and landscape features. The wind turbines would be visible from the populated areas of Herried, Pollock, and Mound City, South Dakota. Segments of the Native American Scenic Byway would be moderately impacted with views of the Project at ≈ 12 mi. The tips of the blades, though not the center of the rotor hub, would be seen at additional locations and further distances, such as elevated points of Mound City.

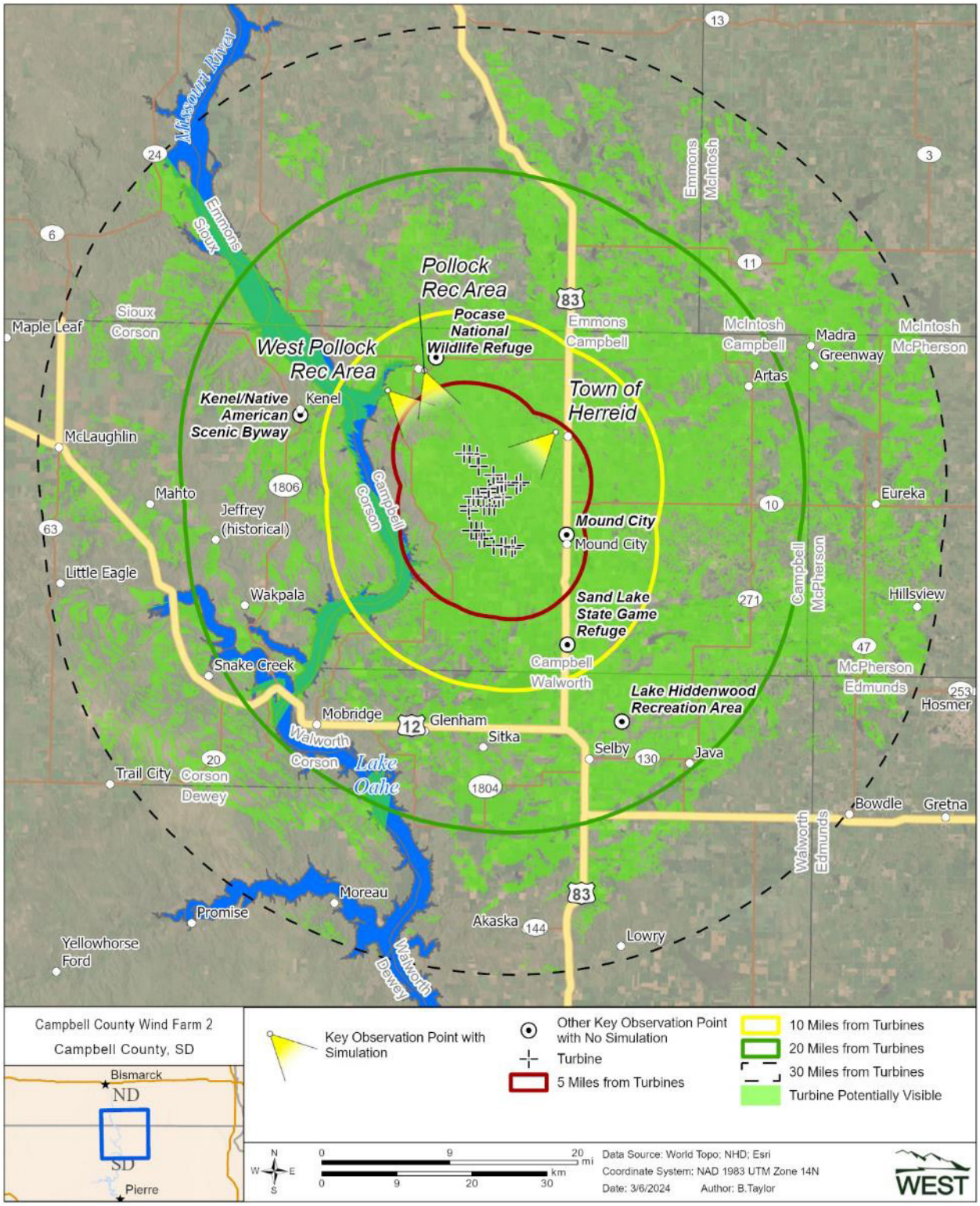

Figure 3.11-1. Visibility of the wind turbines at varying distances.

The visual contrast between each KOP listed in Table 3.11-2 has a unique visual impact depending on the topography and the distance from the turbines. The KOPs were selected based on where people are likely to congregate and where visual impacts could be the highest. Towns, recreation sites, and sensitive cultural sites were all considered when determining the KOP locations. Table 3.11-2 describes each KOP based on viewer sensitivity, viewer number, visual quality, and approximate distance from the nearest turbine. Table 3.11-2 also shows a summarized degree of impact at each location. Each KOP was surveyed in September 2023. A 50-millimeter equivalent lens was used to capture a panorama of photographs from a stationary point. This lens most closely approximates the human field of vision and does not distort the apparent size or scale of objects in the scene. Visual simulations were created for three KOP locations to visualize the impacts to the existing landscape, and shown in Figures 3.11-2, 3.11-3, and 3.11-4. The three KOP locations (Herreid, West Pollock Recreation Area, Pollock Recreation Area) were chosen based on the severity of the visual impact at varying distances, as illustrated in Table 3.11-1.

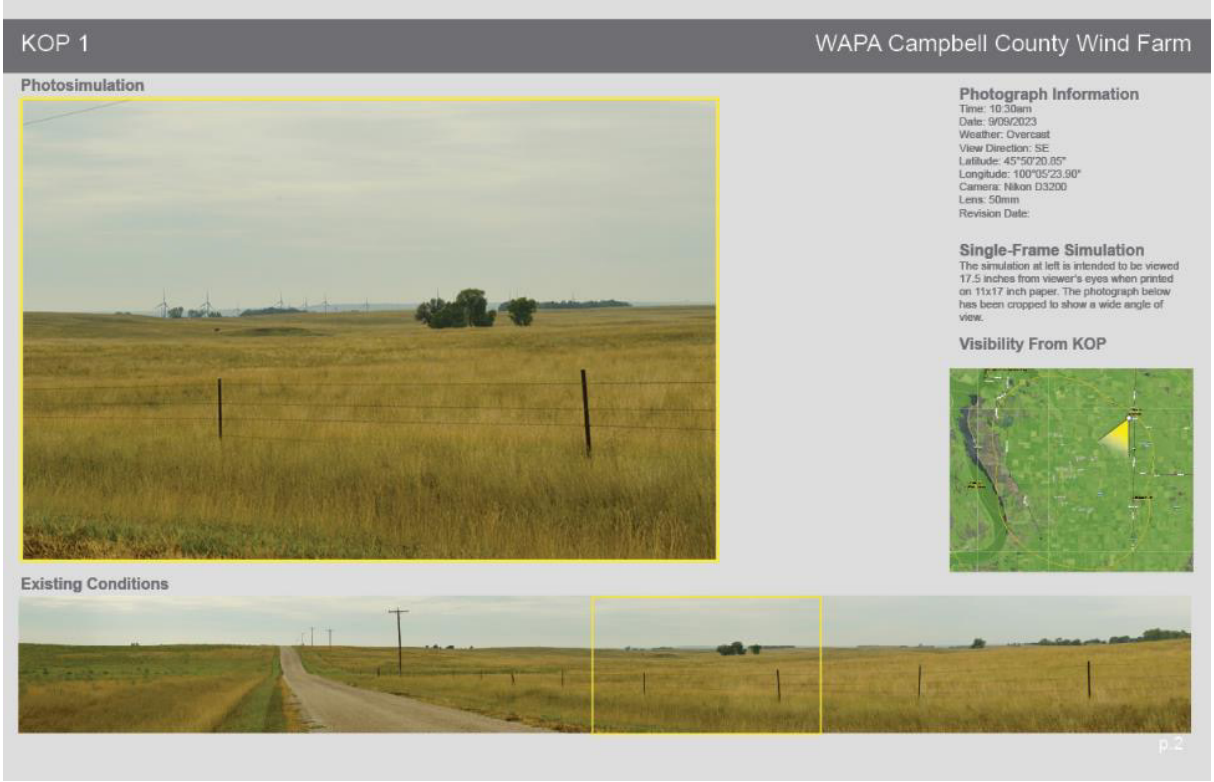

Figure 3.11-2. Simulation from the Town of Herreid key observation point.

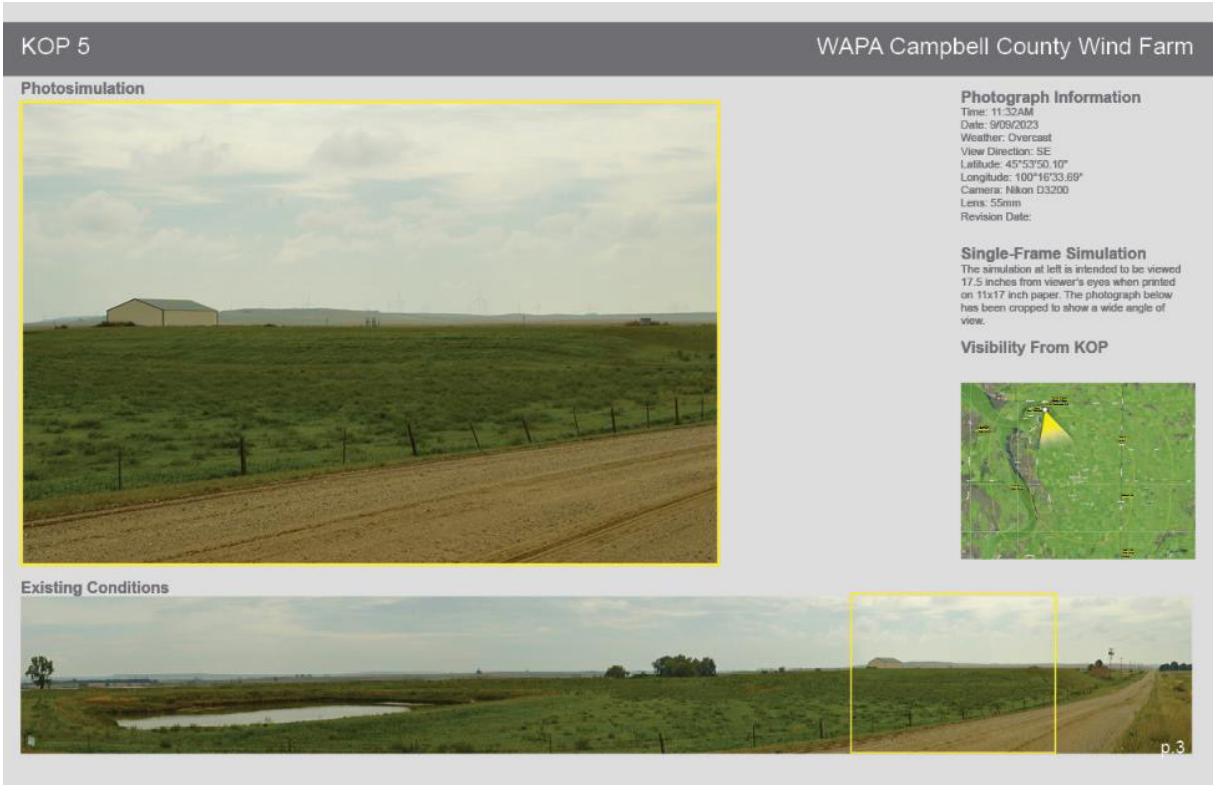

Figure 3.11-3. Simulation from the Pollock Recreation Area key observation point.

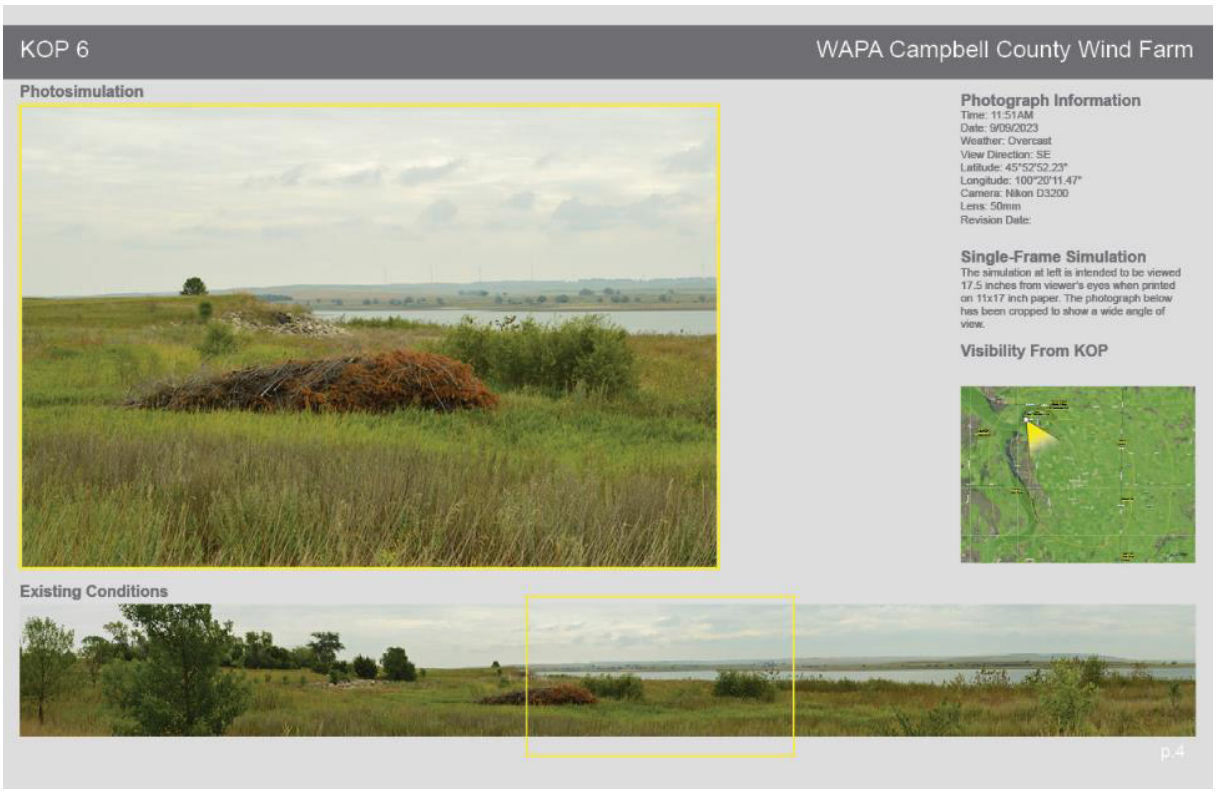

Figure 3.11-4. Simulation from the West Pollock Recreation Area key observation point.

3.10.2.1 Shadow Flicker Effects

Shadow flicker occurs when wind turbine blades pass in front of the sun to create recurring shadows on an object. Such shadows occur under conditions influenced by sun position, wind direction, time of day, and other similar factors. It is perceived as a "flicker" due to the rotating blades repeatedly casting the shadow. Shadow flicker becomes less noticeable with increasing distance from a wind turbine. Although shadow flicker may occur only a few hours in a year, it could create a nuisance for homeowners near turbines. Shadow flicker at distances greater than 10 rotor diameters (i.e., about 4,490 ft or 0.85 mi) is generally relatively low intensity and considered imperceptible (Haley and Partner 2020). At such distances, shadow flicker is typically only caused at sunrise or sunset, when cast shadows are sufficiently long and are generally greater in winter months due to the angle of the sun.

Computer models can accurately predict when, where, and to what degree this problem will occur, so wind project developers can minimize this impact during the site selection process. CCWF2 has conducted a shadow flicker analysis for the Project that models and evaluates the expected effects of shadow flicker during operation (Tetra Tech 2024; Appendix I). State and federal law do not regulate hours per year of shadow flicker impacts to receptors. However, 30 hours per year of shadow flicker impacts is considered acceptable by industry in the U.S. at non-participating receptors (Tetra Tech 2024).

WindPro software was used to analyze shadow flicker impacts at 29 turbine locations plus four alternate turbine locations (Tetra Tech 2024). Over the course of the Project development, two of the four alternate locations are now considered primary locations for the 29 turbines being built. Due to inclusion of the four alternate locations in the analysis, for a total of 33 turbines rather than 31, the shadow flicker impacts are overestimated. Modeled hours present "worst-case" scenarios such that hours presented would be the maximum expected per receptor. Receptors modeled to have shadow flicker impacts because of the two alternate turbine locations would have significantly lower effects, assuming the alternate turbines would not be built.

Of 34 modeled receptors, 21 are expected to receive zero hours of shadow flicker per year and eight receptors would receive < 10 hours. All nonparticipating receptors are expected to receive from zero to ≤ 9 hours per year of shadow flicker. Two participating receptors are expected to receive 20 to 30 hours of shadow flicker, and three participating receptors are expected to receive > 30 hours of shadow flicker per year (Tetra Tech 2024). It should also be noted that given 33 turbine locations were evaluated, only 29 will be constructed and therefore shadow flicker impacts at certain receptors may be less than currently modeled. Visual impacts from shadow flicker to nonparticipating receptors would be minor, with moderate impacts to certain participating receptors potentially experiencing over 30 hours of shadow flicker per year.

3.10.2.2 Lighting Effects

Current FAA requirements for wind turbine lighting (FAA 2020) typically include red, simultaneously pulsating nighttime lighting and no daytime lighting (as white towers are sufficiently conspicuous to pilots). Use of ADLS could be used, pending coordination with the FAA. ADLSs temporarily activate red nighttime lights only when aircraft enter the airspace and remain lit until ≈ 30 seconds after the aircraft leaves the airspace. Without the use of an ADLS, night-sky contrasts would be relatively substantial in the rural, undeveloped Analysis Area because there are few other light sources, no similar simultaneous pulsating red lights, and a generally featureless dark background. The lights could be visible for > 20 mi, depending on atmospheric conditions, and the lights could create strong long-term visual impacts (Sullivan et al. 2012). Implementation of an ADLS would substantially reduce visual effects from nighttime aviation safety lighting.

3.10.3 Environmental Consequences: No Action Alternative

Under the No-action Alternative it is assumed the Project would not be developed. No specific Project-related changes to visual resources would occur in the Analysis Area. Under the No-action Alternative, other visual resource impacts could occur because private landowners may develop agricultural or undeveloped properties for more intensive land uses.

3.11 Cultural Resources

This section analyzes potential impacts from the Project to cultural resources. The general analysis of these resources in Sections 4.9 and 5.9 of the 2015 PEIS is incorporated herein by reference. The Analysis Area for cultural resources is the CCWF2 Project Area. The Project-specific affected environment and impacts for cultural resources are analyzed below.

CCWF2 is committed to implementing the conservation measures for cultural resources derived from Section 5.9.1.6 of the 2015 PEIS, to minimize cultural impacts associated with the Project (see Appendix A).

3.11.1 Affected Environment

Cultural resources include archaeological, historic, and architectural sites or structures, or places that are significant in understanding the history of the U.S. or North America. Cultural resources may also include properties of traditional religious and cultural significance to tribes or traditional cultural place (TCP), defined as sites or places of traditional cultural or religious importance to specified social or cultural groups, including Native American tribes. Cultural resources that meet the eligibility criteria for listing in the National Register of Historic Places (NRHP) are considered “historic properties” under the National Historic Preservation Act (NHPA).

To identify new or previously recorded cultural resources eligible for listing in the NRHP, cultural resource surveys were conducted within the Area of Potential Effects (APE). The APE is

defined as the areas that could experience effects from operation of the Project. The APE includes the area of potential direct physical effects, which was defined by WAPA in consultation with the State Historic Preservation Officer (SHPO), and includes all areas of physical ground disturbance, including a 250 ft radius around each turbine, alternate turbine, and MET tower location, a 100-ft wide survey corridor along the centerline of each access road and distribution line, a 125-ft wide survey corridor along the centerline of the overhead transmission line, and a 200-ft buffer around each block area (e.g., substation, temporary lay down area, batch plant). Using these parameters, the Class III inventory area encompassed an APE of 1,381 ac.

The APE also includes areas that could experience visual and auditory effects resulting from operation of the Project. The APE for visual effects to historic properties extends out two miles from the proposed turbine locations.

3.11.1.1 Records Search

A review of South Dakota Archaeological Research Center records for previously recorded archaeological sites and previous cultural resource surveys was conducted in two stages. The first file search was conducted on November 30, 2022, and revealed 16 prehistoric and historic sites and 54 architectural sites recorded on eight projects within a 2-mi radius of the APE (Logan Simpson 2023). A formal file search was conducted on August 24, 2023, in preparation for the Class III inventory. This file search confirmed what was found on the Class I report file search and no additional sites or inventories were in the formal file search. Only three prehistoric archaeological sites, stone circles, and stone cairns, and one abandoned historic structural ruin were near, but not within, the physical APE. Two of the prehistoric sites are eligible for NRHP listing and one was unevaluated. The abandoned historic structure was evaluated as not eligible for NRHP listing. None of the sites or structures were located within the proposed direct physical APE.

Four structures, located on three sites and a historic railroad grade, are in the 2-mi visual APE buffer area. All four of these properties were previously evaluated as eligible for nomination to the NRHP.

Subsequently, individual file searches were completed for two addendums that identified additional APE for the Project. After being informed that one private landowner changed their mind about the temporary MET tower placement on their land, a new location was selected and a file search for the MET tower addendum was conducted on July 2, 2024. The file search revealed no sites and one structure within a 1-mi radius of the survey area, with the previously recorded resource, an ineligible structure, not being located within the proposed direct physical APE (BCA 2024a). Following submission of the first addendum, further infrastructure modifications were made to the Project layout that required a second addendum. These changes included additional temporary improvements to proposed access roads, a new laydown yard, and other minor adjustments that fall outside the previously inventoried area. As a result, a file search for the additional areas in the second addendum was conducted on October 3, 2024. The file search revealed 12 sites and 38 structures within a one-mile radius of

the survey area (BCA 2024b). Two of the previously recorded cultural resources were within the physical APE, one stone feature site that was unevaluated for NRHP listing and one abandoned dwelling and barn that was determined not eligible for inclusion in the NRHP.

3.11.1.2 Field Survey

The inventory was conducted over five field sessions, with each timed to make sure agricultural fields were harvested prior to the inventory. The initial three field sessions were conducted on September 5 – 12, 2023, November 13 – 18, 2023, and March 18 – 22, 2024. The only find during the initial Class III inventory was an isolated sandstone mano (39CA0260) identified within the APE along a collection line route. Limited testing indicates a very low probability that additional buried cultural materials are present. The isolated find is not eligible for inclusion in the NRHP and no further work is recommended.

Tribal surveys were conducted by the Sisseton Wahpeton Oyate tribe in March of 2024. The tribe located 14 sites of tribal interest and two areas were located that may contain sites of tribal interest. The tribe inventoried avoidance corridors around all the sites and recommended fencing and monitoring of these sites during construction.

The fourth field session was conducted on July 19, 2024, to evaluate the new MET tower location for the MET tower addendum. No cultural resources were encountered during the intensive pedestrian survey.

The final field session was conducted on October 21 – 22, 2024 to evaluate the additional areas identified in the second addendum. The two previously recorded cultural resources identified in the file search within the APE were re-evaluated during the Class III inventory (39CA0234 and CA00000062), and one new site of tribal interest was encountered (39CA0304). The previously recorded stone feature site (39CA0234) located near construction of a proposed access road and turnout is recommended to remain unevaluated for NRHP listing. The Project would avoid the stone feature site, as all proposed construction activities remain on the opposite side of the road outside of the site boundary, and as such no additional avoidance measures are recommended for the site. The previously recorded abandoned dwelling and barn (CA00000062) is located at a corner where additional temporary workspace is needed to allow for large trucks to maneuver between roads. During the field survey several additional structures were noted (Site ID 26804) and it was noted the site is currently occupied, but nothing was observed that would warrant a recommendation to change the determination of not eligible. As this site is not a historic property and would not be physically or visually affected by the Project, no specific avoidance measures are recommended. A new site of tribal interest, a stone feature site (39CA0304) located within proposed additional temporary workspace, was identified during the Class III inventory for the second addendum by the Sisseton Wahpeton Oyate tribe. The stone feature site is unevaluated for NRHP listing, and site avoidance is recommended by a minimum of 50 feet with temporary avoidance fencing placed along the edge of the avoidance buffer during construction activities. With implementation of avoidance measures, the site would not be adversely affected by construction of the Project.

3.11.1.3 Visual and Auditory

File searches found that 21 historic structures that were previously recorded and evaluated are within the visual APE. A reconnaissance architectural survey of structures was conducted within a 2-mi buffer of the proposed wind farm for potential historic architectural sites. Satellite imagery, topographic maps, and a records search provided by the South Dakota Archaeological Research Center were used to determine buildings, structures, and previously recorded sites. No additional historic structures were located because of the reconnaissance file search. The Project is in agricultural fields some distance from any standing structures. In general, the structures are more prevalent near Highway 1804 to the west and Highway 83 to the east. None of the structures within the two-mile view shed are eligible for nomination to the NRHP and no further visual analysis was conducted.

3.11.2 Environmental Consequences: Proposed Action Alternative

3.11.2.1 Archaeological Resources/Traditional Cultural Places

Section 5.9.1 of the 2015 PEIS describes common impacts wind energy projects can have on cultural resources which could apply to resources found within the CCWF2 Project Area, depending on the evaluation of isolated finds, as well as completion of the Class III inventory.

WAPA has evaluated the effects of the Project on cultural resources and finds that the Project will have no effect on any cultural resources or historic property. The Sisseton Wahpeton Oyate have identified 15 sites and 2 areas where they recommend avoidance from all project impacts and have further recommended fencing and monitoring.

No historic structures were found in the visual APE and no further work is needed. WAPA consulted the South Dakota SHPO on its finding of no historic properties affected on June 12, 2024, receiving concurrence on June 28, 2024. Following completion of the two subsequent addendums to the proposed undertaking, WAPA consulted the South Dakota SHPO to confirm concurrence with its finding of no historic properties affected on August 9, 2024, and December 18, 2024, receiving confirmation of concurrence on August 28, 2024 and February 14, 2025, respectively.

3.11.3 Environmental Consequences: No Action Alternative

The No Action Alternative would have no direct or indirect impacts on cultural resources. Existing activities, such as farming and the trend toward conversion of undeveloped land to agriculture, would likely continue and could affect any unidentified cultural resources, should they occur.

3.12 Health and Safety

Section 5.13 of the 2015 PEIS discusses health and safety issues associated with wind energy development, including occupational health impacts on workers and environmental health concerns in the area around the facilities. Project-specific health and safety concerns of climate-

related hazards, electric and magnetic fields (EMFs), and spray applications are described below.

3.12.1 Affected Environment

3.12.1.1 Climate-Related Hazards

The Project is located where strong storms, including tornados and derechos, which are widespread, long-lived windstorms with straight-line winds reaching ≥ 58 mph, could occur (Corfidi et al. 2024). Tornadoes do not occur frequently in the CCWF2 Project Area. Since 1951, the National Centers for Environmental Information has documented ≤ 15 tornadoes in Campbell County (National Oceanic and Atmospheric Administration 2024). Derechos can occur in all six states in UGP, but are most common in eastern South Dakota, eastern Nebraska, southern Minnesota, and Iowa, where they occur ≈ once every two years (National Weather Service 2022). Blizzards and ice storms can occur in this area of South Dakota, with strong winds and risk of ice formation on turbine blades, which creates a potential for ice throw that could create a hazard in adjacent areas.

3.12.1.2 Electric and Magnetic Fields and Electromagnetic Interference

EMFs at the Project are not expected to differ from those discussed in the 2015 PEIS but are discussed here due to frequent public concern over them. Natural and manufactured sources of EMFs are commonplace in the U.S. Electric fields exist wherever an electric charge exists. A magnetic field exists when that charge is in motion (i.e., the flow of electrons to produce an electric current). EMFs are vector quantities, which means they have a strength and a specific direction. The strength of an EMF decreases substantially with increasing distance from the source (National Institute of Environmental Health Sciences [NIEHS] 2024). The International Commission on Non-ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronics Engineers (IEEE) have issued guidelines for exposure to EMFs (ICNIRP 1998, IEEE 2002).

At wind farms, primary areas where EMFs exist include: (1) at the point of power injection into the high-voltage transmission or distribution grid, (2) in the vicinity of the generator in each turbine's nacelle, (3) in the vicinity of any electrical transformer (i.e., transformers located at individual turbines and the CCWF2 Substation), and (4) in the vicinity of the power cables (collection lines) connecting the turbines to the CCWF2 Substation (see Section 3.8.2.2 of the 2015 PEIS). Research has shown EMF levels at these locations (e.g., at most 0.5 milligauss [mG] at the source) are well below the IEEE maximum permissible exposure levels at these EMF sources of 27.1 Gauss (G) for the head and torso and 632 G for appendages (IEEE 2002, 2015 PEIS), and fade to negligible ≥ 10 to 25 ft, with no detectable levels at ground level from the turbine nacelle or buried collection lines. EMF levels at the Project are expected to produce the same low EMFs as those discussed in the 2015 PEIS. The Project gen-tie line would serve as a source of EMFs (Table 3.13-1). As Table 3.13-1 shows, the magnetic field of a sample gen-tie line decreases by 88% (from 57.5 to 7.1 mG) at 100 ft away from the gen-tie line and by 97% (from 57.5 to 1.8 mG) at 200 ft away from the gen-tie line. Furthermore, the EMF exposure is

expected to be < the EMF generated by many common household appliances (Table 3.13-2) and below the midpoint of the USEPA recommendations.

Table 3.13-1. Example EMF levels with increasing distance from a 230-kV overhead transmission line.

Transmission Line Voltage (kV)	Electric Field (kV)[a]				Average Magnetic Field (mG)[a]			
	At the Source	100 Feet Away	200 Feet Away	300 Feet Away	At the Source	100 Feet Away	200 Feet Away	300 Feet Away
230	2.0	0.3	0.05	0.01	57.5	7.1	1.8	0.8

Source: Bonneville Power Administration (1994).

a. kV = kilovolt, mG = milligauss; EMF = electric and magnetic fields.

Table 3.13-2. EMF levels of common household appliances.

Appliance	Average Magnetic Field (mG)[a] Within 6 Inches	Average Magnetic Field (mG)[a] 4 Feet Away
Blender	30-100	0
Dishwasher	10-100	0-1
Microwave Oven	100-300	0-20
Electric Range	20-200	0-6
Refrigerator	0-40	0-10
Vacuum Cleaner	100-700	0-10

Source: U.S. Environmental Protection Agency (1992).

a. mG = milligauss; EMF = electric and magnetic fields.

3.12.1.3 Aerial Spray Application Safety

Due to the prevalence of agricultural land in the CCWF2 Project Area, there is an increased likelihood of crop duster activity (e.g., pesticide applications from airplane or helicopter) in the vicinity of the Project. Crop dusters have been documented to strike unmarked towers and gen-tie lines. Risk surrounding crop dusting and wind energy facilities are primarily associated with turn radii needed to safely maneuver, turbulence turbine blades are purported to emit, and potential shadow flickers created from rotation of the turbines (Manjooran 2013). These combined factors have led to concerns in the increased complexity of aerial applications to maintain crop productivity and pilot safety.

3.12.1.4 Waste Materials

Construction, operation, maintenance, and decommissioning of the Project would be expected to generate waste. Construction and decommissioning would be expected to produce the most material waste. Total weight of material used to produce a wind turbine, including tower, nacelle, and blades (foundation not considered), varies depending on size. The amount of steel used in one wind farm is ≈ 107–132 tons per MW, accounting for 24% of total materials in a land-based wind farm, while concrete, ≈ 243–413 t/MW, accounts for ≈ 72% (Global Wind Energy Council 2022). While most materials brought to the CCWF2 Project Area will be for construction of components, trash and excess materials would be produced. Wind farms in

operation across the U.S. annually replace ≈ 2.4% of wind turbine blades (Piel et al. 2019). Of the materials and components of a wind turbine's total mass, ≈ 90% can be recycled. The remaining 10% of a wind turbine's mass consists of composite materials used in the production of wind turbine blades, which are not easily recyclable (Global Wind Energy Council 2022).

3.12.2 Environmental Consequences: Proposed Action Alternative

Potential Project-specific impacts are discussed below, including those associated with climate-related hazards, EMFs, and spray applications. The remaining health and safety impacts applicable from the 2015 PEIS are incorporated herein by reference (see Section 5.13 of the 2015 PEIS).

3.12.2.1 Climate-Related Hazards

Hazards from damaged wind turbines resulting from thrown parts or collapsed towers, or ice throw from ice buildup on blades, are a consideration in this part of South Dakota given the risk of tornados, derechos, blizzards, and ice storms. However, few records of damage to wind turbines from derechos or tornadoes were found to be reported. Project turbines are designed to withstand ≤ 52 m/s (116 mph) winds. To keep the blades from spinning at dangerous speeds, turbines would have built-in mechanisms that lock and feather blades when wind speeds exceed specified wind speeds (DOE 2018). For the Project model, turbines would be shut down when wind speeds are ≥:

- 26 m/s (> 600-second duration)
- 31 m/s (> 30-second duration)
- 35 m/s (> 3-second duration)
- 36 m/s (instantaneous, sampled every 1 second; GE Renewable Energy 2022)

The relative infrequency of these storms, the localized area that is generally affected, turbine design and safety measures, and lack of evidence of past damage indicate potential hazards from damaged or broken turbines due to high winds is low. However, the Fourth National Climate Assessment (NCA; U.S. Global Change Research Program 2018) predicts South Dakota and the Northern Great Plains are likely to increasingly experience extreme heat, drought, severe weather, heavy downpours, and flooding with acute storm events occurring with increasing frequency and intensity. While potential impacts are not possible to accurately predict, it is anticipated that permanent impacts to Project infrastructure could occur in extreme weather conditions, which could present health and safety hazards similar to those described below.

As discussed in the 2015 PEIS, both blade throw and ice throw rarely occur, based on quality control standards for utility-scale wind turbine manufacture and turbine control software that triggers a turbine to stop rotating if ice buildup occurs.

3.12.2.2 Electric and Magnetic Fields and Electromagnetic Interference

Potential health effects from EMFs have been extensively studied; however, results show no evidence of a link between EMF exposure and health, including cancer (NIEHS 2024). Given EMF levels in the wind farm and along the Project gen-tie line are expected to be below the IEEE occupational and general public maximum permissible exposure levels (IEEE 2002), lower than many common household appliances (USEPA 1992), and below the midpoint of USEPA's recommendations, no health impacts from the Project are anticipated.

While the effects of electromagnetic interference are not recognized as a direct risk to human health, interference of telecommunication frequencies could impact communications to and from emergency services and could be categorized as a safety hazard. In a microwave study conducted on Project infrastructure sites, two microwave paths were in the CCWF2 Project Area (Appendix J). Turbines were sited away from these paths to eliminate potential impacts to the interference.

3.12.2.3 Aerial Spray Application Safety

The Project would have no significant impact on commercial, private, or military flight safety. The continued applicability of aerial crop dusting in the CCWF2 Project Area would be of concern to surrounding land and business owners. Aerial crop dusting ideally occurs during low wind conditions to reduce the effects of spray drift and turbulence. Wind turbines are typically non-operational and pose little threat to maneuverability for pilots during these conditions. Non-operational turbines still pose a safety threat as obstacles for pilots. Pilots regularly plan for obstacles encountered in their flight path including power lines, agricultural infrastructure, trees, and occupied residences. To ensure pilots can properly prepare for these obstructions in their flight path, CCWF2 will coordinate with the FAA in implementing measures to aid in visibility of turbines and MET towers. CCWF2 would coordinate directly with landowners should crop dusting be needed.

3.12.2.4 Waste Materials

During construction, excess trash and waste materials would be brought to nearby landfills and disposal sites. Given most materials brought to the CCWF2 Project Area would be used in construction of the components, excess trash and materials would be low, and impacts to local landfills are expected to be minor. Concrete would be batched on-site, allowing for more accurate and on-demand concrete use, limiting excess material. CCWF2 has committed to waste management practices, described below, to limit excess trash.

At the end of the expected 35-year Project lifespan, if CCWF2 elects to end commercial operations and decommission, or replace (repower) the turbines with new technology, material waste would be generated. Components would be removed, as necessary and either recycled, salvaged, sold, or disposed. This would contribute to material waste and may contribute to local waste collection sites. It is expected that larger components and waste would be brought to larger, appropriately sized facilities outside Campbell County. Hazardous materials would be disposed of through the hazardous materials management plan developed for the Project. Impacts to waste collection sites would be minor during construction, and moderate at decommissioning.

3.12.3 Environmental Consequences: No Action Alternative

The No Action Alternative would have no direct or indirect impacts on health and safety. Existing activities, such as farming and crop-dusting activities near existing gen-tie lines, would continue. These types of activities have inherent occupational health and safety hazards. Health and safety risks resulting from climate change would not be expected to increase.

4.0 Cumulative Impacts

This section analyzes the potential cumulative impacts to resources of past, present, and reasonably foreseeable federal and non-federal actions when added to the effects from the Proposed Action or No Action Alternatives. This EA addresses climate change as an environmental trend contributing to cumulative effects on resources. Effects of climate change on the Project under the Proposed Action Alternative are discussed in Sections 3.1, 3.2, and 3.13; while the Project effects on climate change are discussed in Sections 3.3 and 3.6.

The general cumulative impacts of past, present, and future actions on resources in the UGP Region are analyzed in Section 6 of the 2015 PEIS (see Table 6.3-2 of the 2015 PEIS) and are incorporated herein by reference. The contribution of cumulative impacts associated with the Proposed Action Alternative falls in the scope of the cumulative impacts analysis in the 2015 PEIS. Impacts would be minimized and mitigated during the construction and operation of the Project through the implementation of BMPs and conservation measures.

The Cumulative Analysis Area for this analysis is Campbell County and a 10-mi distance from the CCWF2 Project Area. This includes portions of Corson and Walworth counties in South Dakota and Emmons County in North Dakota (Figure 4.0-1). The Project is directly east of the adjacent Campbell County Wind Farm 1, a 94.3 MW facility with 55 1.7-MW turbines. No other wind projects are in the Cumulative Analysis Area.

Other past and current actions contributing to cumulative effects include agricultural land use, including cultivated crops and cattle pasture. As of 2017, ≈ 88% of land in Campbell County was used for agriculture, the vast majority of which was cultivated crops (USDA 2019).

The Fourth NCA describes the Great Plains region as expecting extreme heat, drought, severe weather, heavy downpours, and flooding from future climate change (Reidmiller et al 2018).

These events could affect health and safety, air, water quality, and other resources as evaluated in this EA (Table 4.0-1). Climate change impacts on each resource covered in this EA continue to occur over time and are complex, particularly regarding vegetation and wildlife. Thus, these effects are not reasonably foreseeable. Other impacts, particularly to soil and water, may be assessed more easily, as summarized in Table 4.0-1, along with other cumulative effects on resources for the Proposed Action and No Action Alternatives.

The Proposed Action Alternative would avoid impacts, as practicable, during construction, operation, and decommissioning. If the No Action Alternative were implemented, impacts from other past, present, and reasonably foreseeable actions in the vicinity of the Project would continue. With implementation of conservation measures for each resource, cumulative impacts from the Proposed Action Alternative on evaluated resources would be minor, except for visual resources. Visual impacts are in the scope of the 2015 PEIS and applicable conservation measures from the 2015 PEIS would be implemented to minimize impacts.

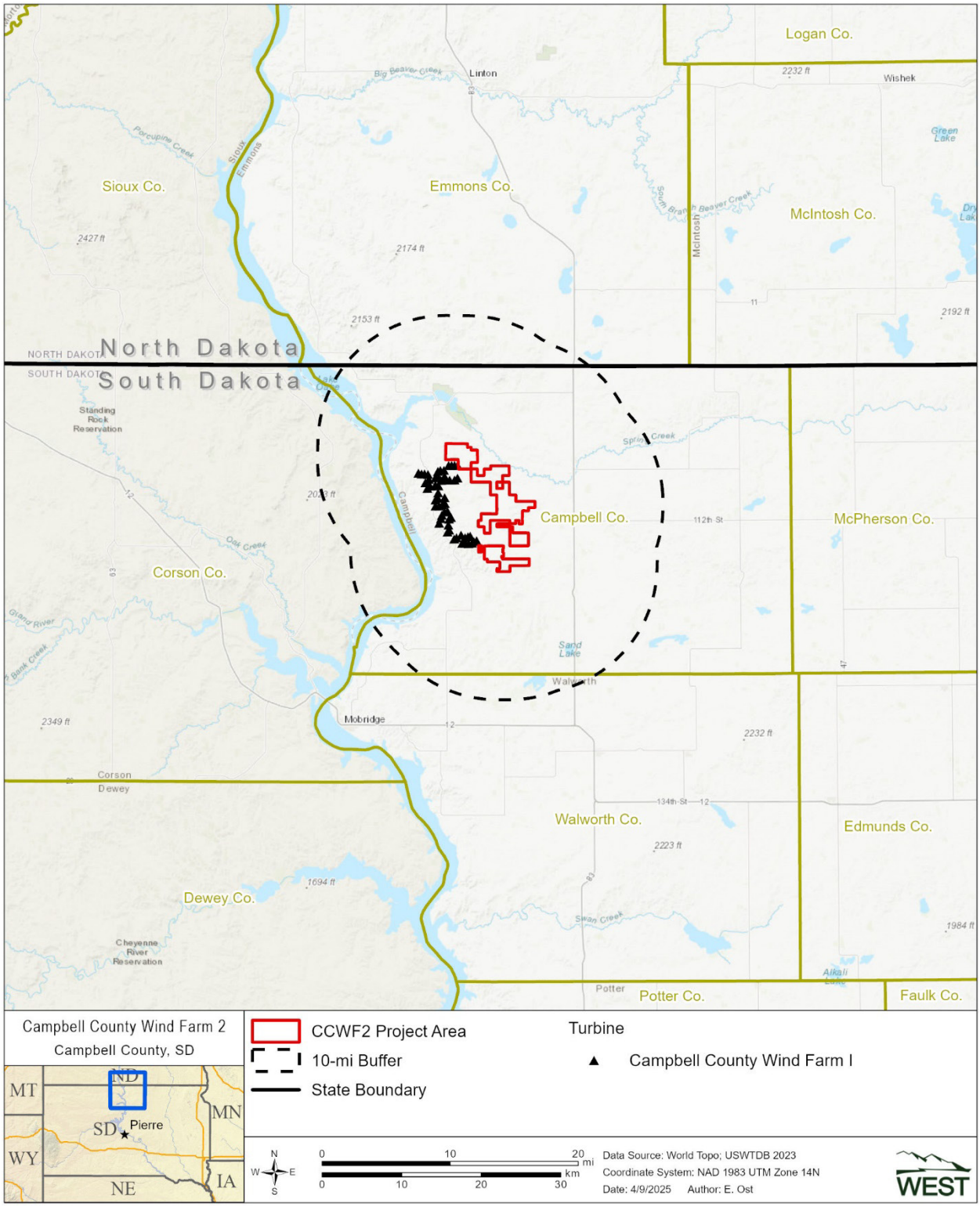

Figure 4.0-1. Existing wind farms in the Cumulative Analysis Area.

Table 4.0-1. Discussion of cumulative impacts.

Resource	Cumulative Impacts of the Proposed Action Alternative	Effect from Past, Present, and Reasonably Foreseeable Actions of the No Action Alternative
Geology – Soils and Paleontology	Project construction could contribute incrementally to wind and water soil erosion, compaction, and soil contamination along with ongoing farming activities. The contribution to cumulative impacts would be temporary and minor with implementation of proposed conservation measures. Project operation would contribute incrementally to long-term soil loss due to construction of permanent wind facilities; however, the contribution relative to the Analysis Area would be negligible.	The No Action Alternative would result in continued, long-term wind and water soil erosion, compaction, and soil contamination from ongoing farming activities.
Water Resources	Project construction could contribute incrementally to increased water use and decreased water quality due to stormwater runoff from construction areas and impacts to streams/wetlands, along with ongoing farming activities. Contributions to cumulative impacts would be temporary and minor with implementation of proposed conservation measures. Project operation could contribute incrementally to altered stream flows, along with anticipated increases in flood frequency and intensity due to climate change. Cumulative impacts would be minimized through coordination with the U.S. Army Corps of Engineers and South Dakota Department of Agriculture and Natural Resources for water resource permitting.	The No Action Alternative would result in continued, long-term water use and potential decreased water quality due to ongoing farming activities.
Vegetation and Land Cover	Project construction could contribute incrementally to the spread of invasive and noxious weeds and a temporary loss of vegetative cover, along with ongoing farming. Contributions to cumulative impacts would be temporary and minor with implementation of proposed conservation measures. Project operation would contribute incrementally to the long-term conversion of grassland and agricultural land, including prime farmland, to a developed (industrial) use, along with Campbell County Wind Farm 1. Cumulative impacts would be minor given the relatively small areas affected.	The No Action Alternative would result in continued potential spread of invasive and noxious weeds through ongoing farming activities, though at a potentially lower rate.
Wildlife	Project construction would contribute incrementally to disturbance, displacement, and potential mortality of common wildlife and fish, primarily in pasture, field edges, and riparian and aquatic habitats, along with ongoing farming activities. Contributions to cumulative impacts would be temporary and minor with implementation of proposed conservation measures. Project operation would contribute incrementally to long-term disturbance, displacement, and mortality of wildlife, primarily birds and bats through turbine collisions, along with the Campbell County Wind Farm 1. With implementation of proposed conservation measures, cumulative impacts would be minor.	The No Action Alternative would result in continued disturbance, displacement, and potential mortality of common wildlife and fish from ongoing farming activities and continued operation of Campbell County Wind Farm 1.

Resource	Cumulative Impacts of the Proposed Action Alternative	Effect from Past, Present, and Reasonably Foreseeable Actions of the No Action Alternative
Threatened and Endangered Species	Project operation could contribute incrementally to loss of wetland stopover habitat for endangered whooping cranes, along with ongoing farming activities. Commitment to providing habitat offsets for these lost wetlands would reduce impacts. Whooping cranes may already avoid wetland habitats in proximity to existing operational turbines at Campbell County Wind Farm 1. Project operation may contribute to northern long-eared bat (NLEB) mortality during spring and fall migration. Project siting and commitments to raise cut-in speeds would reduce impacts. Given implementation of proposed conservation measures, cumulative adverse impacts would be avoided, minimized, and/or offset in consultation with the USFWS.	The No Action Alternative would result in continued loss of wetland stopover habitat for whooping cranes due to farming activities and continued operation of Campbell County Wind Farm 1. Operation of Campbell County Wind Farm 1 should comply with the ESA, and impacts should be accounted for.
Air Quality and Climate	Project construction would have minor contributions to decreased air quality from construction emissions of greenhouse gas (GHG) and other air pollutants, along with ongoing farming activities; however, these would be negligible. Cumulative impacts would be temporary and negligible with implementation of proposed conservation measures. Project operation would contribute incrementally to beneficial impacts by reducing GHG emissions and subsequent climate change by producing renewable energy that reduces the use of fossil fuels, along with the continued operation of Campbell County Wind Farm 1.	The No Action Alternative would result in continued emissions of GHG and other air pollutants from ongoing farming activities. Contributions to the reduction in GHG emissions and climate change would be smaller based on the continued operation of Campbell County Wind Farm 1.
Socioeconomics	Project construction would contribute to short-term beneficial impacts to the local economy through increased employment, income, and expenditures at local businesses. Project operation would contribute to long-term beneficial cumulative impacts from employment staff, procurement of supplies and services for maintenance, compensation to landowners from lease and easement agreements, and increased tax bases, along with similar contributions from ongoing agricultural activities and the operation of Campbell County Wind Farm 1.	The No Action Alternative would result in continued contributions to local economies, primarily from ongoing agricultural operations and the operation of Campbell County Wind Farm 1.
Transportation and Aviation	Project construction would contribute incrementally to road traffic and road use along with ongoing farming activities and the operation of Campbell County Wind Farm 1. Contributions to cumulative impacts would be temporary and minor with implementation of proposed conservation measures. Project operation would contribute incrementally to cumulative effects at a negligible level. Contributions to aviation impacts are unknown. Should FAA coordination indicate impacts to aviation due to Project operations, CCWF2 and WAPA would coordinate to develop BMPs and mitigative measures, so cumulative impacts would be insignificant.	The No Action Alternative would result in continued ground transportation impacts from ongoing farming activities, and the operation of Campbell County Wind Farm 1.
Noise	Construction and operation of the Project would contribute incrementally to increased noise at sensitive noise receptors, particularly occupied residences, along with ongoing farming activities, traffic, and wind. Contributions to cumulative	The No Action Alternative would result in continued noise at sensitive noise receptors due to

Resource	Cumulative Impacts of the Proposed Action Alternative	Effect from Past, Present, and Reasonably Foreseeable Actions of the No Action Alternative
	impacts would be minor with implementation of proposed conservation measures.	ongoing farming activities, traffic, and wind.
Visual Resources	Project construction would contribute incrementally to visual impacts in the rural setting of the Project. Contribution to these cumulative impacts would be minor given that impacts would be localized and temporary. Turbine operation would contribute to existing visual impacts from continued operation of Campbell County Wind Farm 1. Contribution to cumulative impacts could be minimized through use of an Aircraft Detection Lighting System at the Project, to substantially reduce visual impacts from turbine lighting at night. Cumulative daytime impacts could be moderate to high at occupied residences where > one wind project is visible. Impacts are in the scope of the *2015 PEIS* and would follow applicable conservation measures.	The No Action Alternative would result in continued existing visual impacts from the Campbell County Wind Farm 1.
Cultural Resources	Cultural and Tribal Resources identified during the Class III inventory were not within the Project footprint or are expected to be avoided/mitigated through adjustment of infrastructure, fencing, and monitoring. WAPA is currently consulting with the tribes and State Historic Preservation Office to ensure significant impacts to cultural resources would not occur, such that potential cumulative impacts would be insignificant.	The No Action alternative is not expected to result in cumulative impacts on cultural resources, as Campbell County Wind Farm 1 has completed construction and is not likely to have new impacts on cultural resources.
Health and Safety	Project construction would contribute to short-term cumulative impacts from health and safety risks to workers and residents in the four counties from construction equipment, activities, and vehicle travel risks. Contributions to cumulative impacts would be minimized with proposed conservation measures. Project operation could contribute to long-term cumulative impacts from safety risks to employees and county residents, primarily due to physical and/or electrical hazards from electrical 230-kilovolt overhead transmission lines, the substation, and wind turbines. Implementation of proposed conservation measures, along with industry safety standards, could minimize these impacts.	The No Action Alternative would result in continued long-term health and safety risks to workers and residents in the four counties from ongoing farming activities and operation of Campbell County Wind Farm 1.

5.0 Consultation and Coordination

WAPA held a public scoping comment period from November 2 to December 2, 2022, to provide the public, government agencies, tribal governments, and others to identify issues and alternatives that would help WAPA define the scope of the EA. Both an agency scoping meeting and public scoping meeting were held at separate times on November 2, 2022. Federal, state, and local agencies, and tribal governments were invited to the meetings via letter to provide comments regarding the Project. Landowners in and adjacent to the CCWF2 Project Area were invited via letter to attend the virtual public scoping meeting and/or provide comments, as was the public through announcements in the Prairie Pioneer, the newspaper of record for Campbell County.

Twelve comment submittals (written and by voicemail) were received by WAPA from county, state, and federal agencies, as well as landowners in and near the CCWF2 Project Area. The submittals contained 43 individual comments relating to different aspects of the Project. The public scoping meeting documentation, scoping comments received, and WAPA's responses are included in Appendix B. Information from scoping comments were reviewed and incorporated into the Draft EA, as applicable.

Following completion of the Draft EA, agencies, the public, and other interested parties were invited to review and comment on the document during a 30-day public review period that ended September 30, 2024. Nine comment submittals (written and by voicemail) were received by WAPA from state and federal agencies, as well as landowners in and near the CCWF2 Project Area. The submittals contained 24 individual comments relating to different aspects of the Project. The comments received during the Draft EA public comment period are included in Appendix B. Information from the Draft EA public comment period was reviewed and incorporated into the Final EA, as applicable.

5.1 Federal Agencies

The federal agencies that were contacted during the Draft EA comment period include the following:

- Advisory Council on Historic Preservation
- U.S. Department of Transportation, FAA, Region 8
- FEMA, Region VIII
- Federal Energy Regulatory Commission, Office of Energy Projects
- Federal Highway Administration, South Dakota Division
- USACE, South Dakota Regulatory Office
- USEPA, Region 8
- USDA, NRCS, South Dakota State Office
- USDA, Rural Utilities Service, Water and Environmental Program
- USDA, South Dakota State FSA
- BLM, South Dakota Field Office

- USGS, Missouri Basin
- USFWS, South Dakota Field Office
- USFWS, Sand Lake Wetland Management District
- Bureau of Indian Affairs, Great Plains Regional Office
- U.S. Senate
- U.S. House of Representatives

5.2 State and Local Agencies

The state and local agencies that were contacted during the Draft EA comment period process include the following:

- SDDANR
- SDGFP
- SDDOT, Pierre Region
- South Dakota Public Utilities Commission
- South Dakota SHPO
- South Dakota Department of Tribal Relations
- Governor's Office of Economic Development
- South Dakota School and Public Lands
- South Dakota Office of the Governor
- South Dakota Senate, District 23
- South Dakota House of Representatives, District 23
- Campbell County
- Campbell County Board of Commissioners
- Campbell County Highway Department
- Campbell County Conservation District
- Campbell County Economic Development & Tourism Corporation

5.3 Native American Tribes and Associated Bodies

Pursuant to Section 106 of the NHPA, WAPA initiated tribal consultations with the following Tribes by letter on July 20, 2023:

- Cheyenne River Sioux
- Rosebud Sioux
- Santee Sioux Nation
- Sisseton Wahpeton Oyate
- Standing Rock Sioux

The Cheyenne River Sioux and Sisseton Wahpeton Oyate tribes responded to the consultation request, participated in the Class III Cultural Survey, and have coordinated with WAPA on the Project.

5.4 Non-governmental Organizations

The non-governmental organizations contacted for the EA scoping process included:

- Sierra Club, South Dakota Chapter
- The Nature Conservancy, Minnesota-North Dakota-South Dakota Field Office
- Ducks Unlimited, Great Plains Regional Office
- Izaak Walton League of America, South Dakota Division
- Missouri Breaks Audubon Society
- American Bird Conservancy
- Pheasants Forever, Inc.

6.0 List of Preparers

Table 6.0-1 identifies the personnel responsible for the preparation of this EA.

Table 6.0-1. List of Environmental Assessment preparers.

Agency/Firm and Staff Name	Title
Western Area Power Administration	
Ashley Jackson-Baillie	National Environmental Policy Act Coordinator; Natural Resources Specialist
Jennifer Beardsley	Environmental Manager
Spenser Kuhn	National Environmental Policy Act Coordinator
John Russell	Environmental Manager
Lisa Meyer	Archaeologist
Staffan Peterson	Archaeologist
Brian Pauly	Biologist
Hilary Morey	Biologist
Western EcoSystems Technology, Inc.	
Andrew Sullivan	Project Manager, National Environmental Policy Act (NEPA) Analyst
Marlene Rackley	NEPA Analyst
Kristi Aarsby-Kail	NEPA Analyst
Kirsten Frahm	Wetland Biologist
Arin Thacker	NEPA Analyst, Wildlife Biologist
Martin Piorkowski	Wildlife Biologist
Casi Lathan	NEPA Analyst
Caroline Brown	NEPA Analyst
Erik Ost	Geographic Information Systems Specialist
Brian Barbieri	Geographic Information Systems Specialist
Logan Simpson	
Andrew Newman	NEPA Analyst, Logan Simpson Project Manager
Ted Hoefer III	Cultural Resources Specialist
Sarah Smith	Ecologist

Agency/Firm and Staff Name	Title
Brian Taylor	NEPA Analyst
Kristina Kachur	NEPA Analyst
Steve Sigler	Landscape Architect

7.0 References

Alemu, W.G., G.M. Henebry, and A M. Melesse. 2020. Land Cover and Land Use Change in the U.S. Prairie Pothole Region Using the USDA Cropland Data Layer. Land 9(5): 166. doi: 10.3390/land9050166.

American Bird Conservancy (ABC). 2024. Red Knot. Accessed April 2024. Available online: https://abcbirds.org/bird/red-knot/

American Wind Wildlife Institute (AWWI). 2020. Technical Report 2nd Edition: Summary of Bird Fatality Monitoring Data Contained in Awwic. American Wind Wildlife Information Center (AWWIC) database. AWWI, Washington, D.C. November 24, 2020. Available online: https://rewi.org/wp-content/uploads/2020/11/2nd-Edition-AWWIC-Bird-Report-11-24-2020.pdf

Andersen, B.R. and K. Geluso. 2022. Roost Characteristics of Bats in the Pine Ridge Region of Nebraska. Northwestern Naturalist 103(1): 30-41. doi: 10.1898/1051-1733-103.1.30.

Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. Journal of Wildlife Management 72(1): 61-78. doi: 10.2193/2007-221.

_____ and E.F. Baerwald. 2013. Impacts of Wind Energy Development on Bats: Implications for Conservation. Pp. 435-456. *In*: R. A. Adams and S. C. Pederson, eds. Bat Ecology, Evolution and Conservation. Springer Science Press, New York.

_____ G.D. Johnson, W.P. Erickson, and C.D. Hein. 2013. A Synthesis of Operational Mitigation Studies to Reduce Bat Fatalities at Wind Energy Facilities in North America. A report submitted to the National Renewable Energy Laboratory (NREL), Golden, Colorado. Bat Conservation International (BCI), Austin, Texas. March 2013. Available online: https://www.energy.gov/sites/prod/files/2015/03/f20/Operational-Mitigation-Synthesis-FINAL-REPORT-UPDATED.pdf

Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC, Washington, D.C. Available online: https://www.aplic.org/uploads/files/11218/Reducing_Avian_Collisions_2012watermarkLR.pdf

Baasch, D.M., P.D. Farrell, S. Howlin, A.T. Pearse, J.M. Farnsworth, and C.B. Smith. 2019. Whooping Crane Use of Riverine Stopover Sites. PLoS ONE 14(1): e0209612. doi: 10.1371/journal.pone.0209612.

Bakker, K.K. 2020. South Dakota Species of Habitat Fragmentation Concern: Grassland Birds. Developed for U.S. Fish and Wildlife Service (USFWS), South Dakota Ecological Services Field Office, Pierre, South Dakota. March 3, 2020. 38 pp. Available online: https://www.fws.gov/mountain-prairie/es/southDakota/SD_HAB_FRAG.pdf

Bat Conservation International (BCI). 2024. Bat Profiles. BCI, Austin, Texas. Accessed March 2024. Available online: https://www.batcon.org/about-bats/bat-profiles/

Bates, P. 2019. Abundant Whooping Crane Stopover Habitat on Some Corps of Engineer Lakes in Dakotas and Montana. Friends of the Wild Whoopers. November 22, 2019. Accessed May 2022. Available online: https://www.friendsofthewildwhoopers.org/abundant-whooping-crane-stopove-habitat-coe-lakes-in-dakotas-montana/

Bauman, P., B. Carlson, and T. Butler. 2016. Quantifying Undisturbed (Native) Lands in Eastern South Dakota: 2013. South Dakota State Univeristy, Department of Natural Resources. October 2016. Available online: https://openprairie.sdstate.edu/data_land-easternSD/

_____ B. Carlson, T. Butler, and B. Richardson. 2018. Quantifying Undisturbed (Native) Lands in Northwestern South Dakota: 2013. South Dakota State University, Open Prairie. Available online: https://openprairie.sdstate.edu/data_land-northwestsd/1/

Beaver Creek Archaeology, Inc. (BCA). 2024a. A Level III Intensive Cultural Resource Inventory for the Campbell County Wind Farm 2 Meteorological Tower Project in Campbell County, South Dakota. July 2024.

Beaver Creek Archaeology, Inc. (BCA). 2024b. A Level III Intensive Cultural Resource Inventory and Properties of Traditional Religious and Cultural Significance Survey for the Campbell County Wind Farm 2 Project Addendum in Campbell County, South Dakota. December 2024.

Bedard, A. J., Jr. 1999. Naturally Occurring Sources of Infrasound. Journal of the Acoustical Society of America 105(2): 1103-1103. doi: 10.1121/1.425166.

Bjork, P. and E. Tallman. 1995. Dinosaurs of South Dakota. South Dakota Department of Game, Fish, and Parks, Division of Wildlife, Pierre, South Dakota. 6 pp. Available online: https://www.sdgs.usd.edu/naturalsource/habitats/earth/Dinosaurs.pdf

Bonneville Power Administration. 1994. Electric Power Lines: Questions and Answers on Research into Health Effects. U.S. Department of Energy, Portand, Oregon.

Brady, N.C. and R.R. Weil. 2004. Elements of the Nature and Properties of Soils. Second Edition. Prentice Hall, Upper Saddle River, New Jersey.

Brooks, B. 2013. Campbell County Wind Farm: A Class III Intensive Cultural Resource Inventory in Campbell County, South Dakota. Project No. 2013-1079, Beaver Creek Archaeology, Inc., Bismarck, North Dakota.

Brunner, E., B. Hoen, J. Rand, and D. Schwegman. 2024. Commercial Wind Turbines and Residential Home Values: New Evidence from the Universe of Land-Based Wind Projects in the United States. Energy Policy 185(2024): 113837. doi: 10.1016/j.enpol.2023.113837.

Bureau of Land Management, (BLM). 1986. Manual 8431 - Visual Resource Contrast Rating. Rel. 8-30. January 17, 1986. Available online: https://www.blm.gov/sites/blm.gov/files/program_recreation_visual%20resource%20management_quick%20link_BLM%20Handbook%20H-8431-1%2C%20Visual%20Resource%20Contrast%20Rating.pdf

_____ 2011. North Steens 230kv Gen-Tie Line Project Final Environmental Impact Statement. BLM. Available online: https://www.blm.gov/or/districts/burns/plans/steen_trans/files/00_ProjectCover_FEIS_rev.pdf

Burns & McDonnell Engineering Company Inc. (BMEC). 2020. Year 1 Bat Acoustic Study for the Campbell County II Wind Energy Project. Prepared for Campbell County Wind Farm II LLC, Campbell County, South Dakota. Prepared by BMEC, Kansas City, Missouri. July 24, 2020.

Butler, M.J., C.R. Sanspree, J.A. Moon, and W. Harrell. 2023. Whooping Crane Survey Results: Winter 2022–2023. U.S. Fish and Wildlife Service (USFWS) National Wildlife Refuge System, Division of Biological Services and Aransas National Wildlife Refuge. USFWS Washington, D.C. May 2023. Available online: https://www.fws.gov/sites/default/files/documents/WHCR%20Update%20Winter%202022-2023.pdf

Caven, A.J.; King, K.C.; Wiese, J.D. and E.M. Brinley Buckley. 2017. A descriptive analysis of Regal Fritillary (*Speyeria idalia*) habitat utilizing biological monitoring data along the big bend of the Platte River, NE. Nebraska CooperativeFish & Wildlife Research Unit, Staff Publications. Available online: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1233&context=ncfwrustaff

Chodachek, K., A. Suehring, and T. Wilson. 2022. Post-Construction Bird and Bat Fatality Monitoring Study, Crowned Ridge II Wind Farm, Codington, Grant, and Deuel Counties, South Dakota: March – December 2021. Prepared for Northern States Power, a Minnesota corporation, d/b/a/ Xcel Energy, Minneapolis, Minnesota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. April 27, 2022. Available online: https://puc.sd.gov/Dockets/Electric/2019/EL19-027.aspx

Cook, R, G. Ray and L. Martinson. 2024. Wetland and Waterbody Delineation Report, Campbell County Wind Farm 2, Campbell County, South Dakota. Final. Prepared for Campbell County Wind Farm 2, LLC, Austin, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Fort Collins, Colorado. November 26, 2024.

Corfidi, S. F., J. S. Evans, and R. H. Johns. 2024. About Derechos. National Oceanic and Atmospheric Administration, National Weather Service, National Centers for Environmental Protection, Storm Prediction Center. Last Updated February 12, 2024. Available online: https://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm#strength

Cornell Lab of Ornithology. 2024. All About Birds. Cornell University, Ithaca, New York. Accessed April 2024. Available online: https://www.allaboutbirds.org/news/

Committee on the Status of Endagered Wildlife in Canada (COSEWIC). 2019. COSEWIC assessment and status report on the Sucklye's Cuckoo Bumble Bee Bonbus suckleyi in Canada. 70 pp.

Crawford, M. and L.M. Tronstad. 2020. The status and distribution of Regal Fritillary (*Speyeria idalia*) and Monarch (*Danaus plexippus*) butterflies in eastern Wyoming. Report prepared by the Wyoming Natural Diversity Database, University of Wyoming for the Wyoming Governor's office. Available online: https://www.uwyo.edu/wyndd/_files/docs/reports/WYNDDReports/20cra01.pdf

Cryan, P.M. 2008. Mating Behavior as a Possible Cause of Bat Fatalities at Wind Turbines. Journal of Wildlife Management 72(3): 845-849. doi: 10.2193/2007-371.

_____. and R.M.R. Barclay. 2009. Causes of Bat Fatalities at Wind Turbines: Hypotheses and Predictions. Journal of Mammalogy 90(6): 1330-1340. doi: 10.1644/09-MAMM-S-076R1.1.

Dahl, T.E. 2014. Status and Trends of Prairie Wetlands in the United States 1997 to 2009. U.S. Department of the Interior; Fish and Wildlife Service, Ecological Services, Washington, D.C. pp. 67.

Department of Numbers. 2021. South Dakota Residential Rent and Rental Statistics. Department of Numbers. Accessed May 2021. Available online: https://www.deptofnumbers.com/rent/south-dakota/

Derby, C., A. Dahl, and G. DiDonato. 2014. Post-Construction Fatality Monitoring Studies for the PrairieWinds SD1 Wind Energy Facility, South Dakota. Final Report: March 2013 - February 2014. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

eBird. 2020, 2023, 2024. eBird: An Online Database of Bird Distribution and Abundance [Web Application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available online: https://ebird.org/

ECONorthwest. 2002. Economic Impacts of Wind Power in Kittitas County. Final Report. Prepared for the Phoenix Economic Development Group, Ellensburg, Washington. Portland, Oregon. November 2002.

Egan, D.M. 1988. Architectural Acoustics. McGraw-Hill, New York. 411 pp.

Ellenbogen, J.M., S. Grace, W.J. Heiger-Bernays, J.F. Manwell, D.A. Mills, K.A. Sullivan, and M.G. Weisskopf. 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. Prepared for Massachusetts Department of Environmental Protection, Massachusetts Department of Public Health.

Elliott-Smith, E. and S.M. Haig. 2020. Piping Plover (*Charadrius melodus*), Version 1.0. *In*: A. F. Poole, ed. Birds of the World. Cornell Lab of Ornithology, Ithaca, New York. doi: 10.2173/bow.pipplo.01. Available online: http://birdsoftheworld.org/bow/species/pipplo/cur/

Erickson, J. D. 1992. Habitat Selection and Movement of Pallid Sturgeon in Lake Sharpe, South Dakota. Thesis. South Dakota State University, Brookings, South Dakota.

Esri. 2020. World Terrain Base. ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Basemap created July 1, 2009. Last updated May 27, 2020. Accessed April 2024. Available online: https://www.arcgis.com/home/item.html?id=c61ad8ab017d49e1a82f580ee1298931

_____ 2021, 2023, 2024. World Imagery and Aerial Photos (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Available online: https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=10df2279f9684e4a9f6a7f08febac2a9

Everhart, M. J. 2017. Oceans of Kansas, a Natural History of the Western Interior Sea. Second Edition. Indiana University Press, Bloomington, Indiana, 460 pp.

Federal Aviation Administration (FAA). 2020. Obstruction Marking and Lighting. Advisory Circular AC 70/7460-1M. U.S. Department of Transportation, FAA. November 16, 2020. Available online: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/70_7460-1

Federal Emergency Management Agency (FEMA). 2021. FEMA Flood Map Service Center. U.S. Department of the Interior. Accessed January 2024. Available online: https://msc.fema.gov/ portal/home

GE Renewable Energy. 2022. Technical Documentation Wind Turbine Generator Systems 3.40-140 – 60Hz

Global Wind Energy Council (GWEC). 2022. Global Wind Report 2022. GWEC, Brussels, Belgium. April 4, 2022. Available online: https://gwec.net/wp-content/uploads/2022/03/GWEC-GLOBAL-WIND-REPORT-2022.pdf

Gross, S. 2020. Renewables, Land Use, and Local Opposition in the United States. Brookings Institute. January 2020. Available online: https://docs.wind-watch.org/FP_20200113_renewables_land_use_local_opposition_gross.pdf

Guo, W., L. Wenz, and M. Auffhammer. 2024. The Visual Effect of Wind Turbines on Property Values Is Small and Diminishing in Space and Time. Proceeding of the National Academy of Science 121(13): 1-7. doi: 10.1073/pnas.2309372121.

Haldar, S.K. and J. Tisljar. 2014. Introduction to Mineralogy and Petrology. Elsevier, Inc., Waltham, Massachusettes.

Haley, J. and P.E. Partner. 2020. Pronghorn Flats Wind Farm Shadow Flicker Analysis Banner and Kimball Counties, Nebraska. EAPC Wind Energy Services, Norwich, Vermont.

Headwaters Economics. 2023. A Profile of Socioeconomic Trends: Campbell County, South Dakota. October 2, 2023.

Hines, H.M. and S.D. Hendrix. 2005. Bumble bee (Hymenoptera: Apidae) Diversity and Abundance in Tallgrass Prairie Patches: Effects of Local and Lakdscape Floral Resources. Environmental Entomology, 34, 1477-1484.

Hoen, B., R. Wiser, P. Cappers, M. Thayer, and G. Sethi. 2011. Wind Energy Facilities and Residential Properties: The Effect of Proximity and View on Sales Prices. Journal of Real Estate Research 33(3): 281-316.

_____ J.P. Brown, T. Jackson, R. Wiser, M. Thayer, and P. Cappers. 2013. A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy.

_____ and C. Atkinson-Palombo. 2016. Wind Turbines, Amenities and Disamenities: A Study of Home Value Impacts in Densely Populated Massachusetts. Journal of Real Estate Research 32(4): 473-504.

_____ J. Rand, R. Wiser, J. Firestone, D. Elliot, G. Hubner, J. Pohl, R. Haac, K. Kaliski, M. Landis, and E. Lantz. 2019. National Survey of Attitudes of Wind Power Project Neighbors: Summary of Results. Berkeley Lab. November 2019. Available online: https://emp.lbl.gov/projects/wind-neighbor-survey

HUD Exchange. 2024. Farmlands Protection. HUD Exchange, U.S. Department of Housing and Urban Development. Accessed April 2024. Available online: https://www.hudexchange.info/programs/environmental-review/farmlands-protection/

Institute of Electrical and Electronics Engineers (IEEE). 2002. Ieee Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields 0-3 Khz. Standards Coordinating Committee 28. New York, New York.

International Commission on Non-Ionizing Radiation Protection (ICNIRP). 1998. Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 Ghz). Health Physics 74(4): 494-522.

Kallemeyn, L.W. 1983. Status of the Pallid Sturgeon, Scaphirhynchus albus. Fisheries 8: 3-9.

Kritz, K., M. Rheude, B. Millsap, M. Sadlowski, J. Pagel, M. Stuber, C. Borgman, T. Witting, U. Kirkpatrick, J. Muir, and H. Beeler. 2018. Bald Eagle Mortalities and Injuries at Wind Energy Facilities in the United States. Poster. The Wildlife Society (TWS) 25th Annual Conference, Cleveland, Ohio. October 7 - 11, 2018.

LeBeau, C., K. Smith, S. Howlin, A. Tredennick, and K. Kosciuch. 2023. A Meta-Analysis Investigating the Effects of Energy Infrastructure Proximity on Grouse Demography and Space Use. Wildlife Biology: e01087. doi: 10.1002/wlb3.01087.

Leventhall, G. 2003. A Review of Published Research on Low Frequency Noise and Its Effects. Prepared for the Department for Environment, Food, and Rural Affairs, London, United Kingdom.

_____ 2006. What Is Infrasound? Progress in Biophysics and Molecular Biology 93(1-3): 130-137. doi: 10.1016/j.pbiomolbio.2006.07.006.

Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Sci-anni, D.P. Guertin, M. Tluczek, and W. Kepner. 2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-Arid American Southwest. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046. 116 pp.

Logan Simpson. 2023. A Class I Cultural Resources Inventory for the Campbell County Wind Farm II Project, Campbell County, South Dakota, June 2023

Loring P.H., McLaren J.D., Smith P.A., Niles L.J., Koch S.L., Goyert H.F., and B.H. 2018. Tracking Movements of Threatened Migratory Rufa Red Knots in U.S. Atlantic Outer Continental Shelf Waters. U.S. Department of the Interior, Bureau of Ocean Energy Management, Sterling, Virginia. OCS Study BOEM 2018-046. 145 pp.

Manjooran, P. 2013. Clean Energy or Dangerous Skies? Interactions between the Wind Energy and Aerial Application Industries. Drake Journal of Agricultural Law 18.1(2013): 183-209.

Martin, J.E., J.F. Sawyer, M.D. Fahrenbach, D.W. Tomhave, and L.D. Schul. 2004. Geological Map of South Dakota. State of South Dakota in cooperation with the U.S. Geological Survey. June 30, 2004. Available online: https://www.sdgs.usd.edu/pubs/pdf/G-10.pdf

McNab, W.H. 1996. Chapter 41: Great Plains-Palouse Dry Steppe. Ecological Subregions of the United States. U.S. Department of Agriculture (USDA) Forest Service, Washington D.C. October 30, 1996. Available online: https://www.fs.usda.gov/land/pubs/ecoregions/ch41.html#toc%22

Monarch Joint Venture. 2024. Migration. Accessed November 2024. Available online: https://monarch jointventure.org/monarch-biology/monarch-migration

Montana Natural Heritage Program (MT NHP). 2025. Suckley Cuckoo Bumble Bee—Montana Field Guide. Montana Natural Heritage Program. Accessed online, January 24, 2025 at: https://fieldguide.mt.gov/speciesDetail.aspx?elcode=IIHYM24350.

National Conservation Easement Database (NCED). 2024. Home. NCED. Ducks Unlimited, and The Trust for Public Land, Accessed March 2024. Available online: http://www.conservationeasement.us/

National Insitute of Environmental Health Sciences (NIEHS). 2024. Electric & Magnetic Fields. NIEHS, Health and Education. Accessed April 2024. Available online: https://www.niehs.nih.gov/health/topics/agents/emf

National Land Cover Database (NLCD). 2021. National Land Cover Database 2021 - Landcover & Imperviousness (NLCD2021). Available online: https://www.mrlc.gov/data. *As cited* includes:

Dewitz, J. 2023. National Land Cover Database (NLCD) 2021 Products. U.S. Geological Survey data release. doi: 10.5066/P9JZ7AO3.

National Oceanic and Atmospheric Administration (NOAA). 2024. Storm Events Database. NOAA, National Centers for Environmental Information. Accessed April 2024. Available online: https://www.ncdc.noaa.gov/stormevents/

National Park Service (NPS). 2023. Nationwide Rivers Inventory. NPS, U.S. Department of the Interior. July 2023. Available online: https://irma.nps.gov/DataStore/Reference/Profile/2233706

National Weather Service (NWS). 2022. August 10, 2020 Derecho. NWS, National Oceanic and Atmospheric Administration, South Dakota. Last Updated March 30, 2022. Accessed April 2024. Available online: https://www.weather.gov/dmx/2020derecho

Niemuth, N.D., A.J. Ryba, A.T. Pearse, S.M. Kvas, D.A. Brandt, B. Wangler, J.E. Austin, and M.J. Carlisle. 2018. Opportunistically Collected Data Reveal Habitat Selection by Migrating Whooping Cranes in the U.S. Northern Plains. Condor 120(2): 343-356. doi: 10.1650/CONDOR-17-80.1.

O'Connell, A., C.S. Spiegel, and S. Johnson. 2011. Compendium of Avian Occurrence Information for the Continental Shelf Waters Along the Atlantic Coast of the United States, Final Report (Database Section - Shorebirds). Outer Continental Shelf (OCS) Study Bureau of Ocean Energy Management (BOEM) 2012-076. Prepared for the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center, Beltsville, Maryland. Prepared by the U.S. Fish and Wildlife Service (USFWS), Hadley, Maryland. U.S. Department of the Interior (USDOI), Geological Survey, and (BOEM) Headquarters. April 2011. Available online: http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5193.pdf

Pagel, J.E., K.J. Kritz, B.A. Millsap, R.K. Murphy, E.L. Kershner, and S. Covington. 2013. Bald Eagle and Golden Eagle Mortalities at Wind Energy Facilities in the Contiguous United States. Journal of Raptor Research 47(3): 311-315.

Pallid Sturgeon Recovery Program. 2022. Accessed August 2022. Available online: https://pallidsturgeon.org/

Pearse, A.T., D.A. Brandt, W.C. Harrell, K.L. Metzger, D.M. Baasch, and T.J. Hefley. 2015. Whooping Crane Stopover Site Use Intensity within the Great Plains. USGS Open-File Report 2015-1166. U.S. Geological Survey (USGS). 12 pp. doi: 10.3133/ofr20151166. Available online: https://pubs.usgs.gov/of/2015/1166/ofr2015-1166.pdf

_____ M. Rabbe, L.M. Juliusson, M.T. Bidwell, L. Craig-Moore, D.A. Brandt, and W. Harrell. 2018. Delineating and Identifying Long-Term Changes in the Whooping Crane (*Grus Americana*) Migration Corridor. PLoS ONE 13(2): e0192737. doi: 10.1371/journal.pone.0192737.

_____ D.A. Brandt, D.M. Baasch, M.T. Bidwell, J.A. Conkin, M.J. Harner, W. Harrell, and K.L. Metzger. 2020. Location Data for Whooping Cranes of the Aransas-Wood Buffalo Population, 2009-2018. U.S. Geological Survey (USGS) data release. USGS, Reston, Virginia. May 15, 2020. doi: 10.5066/P9Y8KZJ9. Available online: https://www.sciencebase.gov/catalog/item/5ea3071582cefae35a19349a

_____ K.L. Metzger, D.A. Brandt, J.A. Shaffer, M.T. Bidwell, and W. Harrell. 2021. Migrating Whooping Cranes Avoid Wind-Energy Infrastructure When Selecting Stopover Habitat. Ecological Applications: e2324. doi: 10.1002/eap.2324.

Peterson, S.M., J.P. Traylor, and M. Guira. 2020. Groundwater Availability of the Northern High Plains Aquifer in Colorado, Kansas, Nebraska, South Dakota, and Wyoming. U.S. Geological Survey Professional Paper 1864: 57 pp. doi: 10.3133/pp1864.

Piel, J. H., C. Stetter, M. Heumann, M. Westbomke, and M. H. Breitner. 2019. Lifetime Extension, Repowering or Decommissioning? Decision Support for Operators of Ageing Wind Turbines. Journal of Physics: Conference Series 1222: 012033. doi: 10.1088/1742-6596/1222/1/012033.

Piorkowski, M. 2021a. Eagle and Raptor Nest Survey Campbell County II Wind Project Campbell County, South Dakota. Final Draft. Prepared for ConEdison Clean Energy Business. Valhalla, New York. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. July 30, 2021.

_____ 2021b. Northern Long-Eared Bat Desktop Summer Habitat Assessment, Campbell County II Wind Project, Campbell County, South Dakota. Final Draft Report. Prepared for ConEdison Clean Energy Business, Sioux Falls, South Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 10, 2021.

_____2021c. Technical Memorandum: Campbell County II Wind Project – 2021 Prairie Dog Colony Surveys. Prepared for ConEdison Clean Energy Business. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 10, 2021.

_____ and S. Agudelo. 2021a. 2021 Prairie Grouse Lek Surveys, Campbell County II Wind Project, Campbell County, South Dakota. April 2021. Prepared for Consolidated Edison Development, Inc., Sioux Falls, South Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. July 13, 2021.

_____ and S. Agudelo. 2021b. Avian Use Study, Campbell County II Wind Project, Campbell County, South Dakota. Final Draft Report. June 2020 – May 2021. Prepared for ConEdison Clean Energy Business. Valhalla, New York. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 23, 2021.

_____ and M. Gerringer. 2023. Prairie Grouse Lek Survey Campbell County Wind Farm 2 Campbell County, South Dakota. Final Report March – May 2023. Prepared for RWE Clean Energy, LLC, Austin, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 19, 2023.

_____ and R. Wilson. 2023. Raptor Nest Survey, Campbell County Wind Farm 2, Campbell County, South Dakota. Draft Report: March – July 2023. Prepared for RWE Clean Energy, LLC, Austin, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 18, 2023. 15 pp + appendix.

_____ and M. Chouinard. 2024. Avian Use Study, Campbell County Wind Farm 2, Campbell County, South Dakota. Draft Report March 2023 – February 2024. Prepared for Campbell County Wind Farm 2, LLC, Sioux Falls, South Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. April 30, 2024.

Ramsey, C.G., H.R. Sleeper, and J.R. Hoke. 1994. Architectural Graphic Standards. American Institute of Architects. Ninth Edition. John Wiley, New Jersey.

Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.). 2018. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II. U.S. Global Change Research Program. Washington, D.C., USA. doi: 10.7930/NCA4.2018. Available online: https://nca2018.globalchange.gov/

RGS. 2024. Campbell County Wind Sound Modeling. Prepared for RWE Clean Energy Development, LLC. Prepared by RGS, White River Junction, Vermont. April 2024.

Roberts, M. 2018. Before the Public Utilities Commission of the State of South Dakota, in the Matter of the Application of Dakota Range I LLC and Dakota Range II LLC for an Energy Facility Permit to Construct a Wind Energy Facility. Prefiled Rebuttal Testimony of Dr. Mark Roberts on Behalf of Dakota Range I, LLC and Dakota Range II, LLC. South Dakota Public Utilities Commission (SD PUC) EL-18-03. May 21, 2018. Available online: https://puc.sd.gov/commission/dockets/electric/2018/EL18-003/testimony/dakotarange/rebuttal/roberts.pdf

Runia, T. and A. Solem. 2018. Wildlife Survey Report: Prairie Grouse Occurrence Models for South Dakota. South Dakota Department of Game, Fish, and Parks. Pierre, South Dakota.

_____ A.J. Solem, N.D. Niemuth, and K.W. Barnes. 2021. Spatially Explicit Habitat Models for Prairie Grouse: Implications for Improved Population Monitoring and Targeted Conservation. Wildlife Society Bulletin 45(1): 36-54. doi: 10.1002/wsb.1164.

Selby, G. 2007. Regal Fritillary (*Speyeria idalia* Drury): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available online: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5206808.pdf

Shaffer, J. A. and D. A. Buhl. 2016. Effects of Wind-Energy Facilities on Breeding Grassland Bird Distributions. Conservation Biology 30(1): 59-71. doi: 10.1111/cobi.12569.

_____ C. R. Loesch, and D. A. Buhl. 2019. Estimating Offsets for Avian Displacement Effects of Anthropogenic Impacts. Ecological Applications 29(8): e01983. doi: 10.1002/eap.1983.

_____ C. R. Loesch, and D. A. Buhl. 2022. Understanding the Avian-Impact Offset Method—A tutorial. U.S. Geological Survey Open-File Report 2022–1049, 227 p. doi: 10.3133/ofr20221049.

Sirajuddin, P. and M. Piorkowski. 2023. Bat Summer Presence/Absence Surveys Campbell County Wind Farm 2 Campbell County, South Dakota. Final Report, July 31 – August 9, 2023. Prepared for RWE Clean Energy, LLC, Austin, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. October 23, 2023.

Smith, K., C. LeBeau, S. Brown, and T. Runia. 2021. Sharp-Tailed Grouse Lek Survey and Capture Report for the Crowned Ridge I and II Wind Energy Projects, Grant, Codington, and Deuel Counties, South Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. January 21, 2021.

South Coast Air Quality Management District (AQMD). 2024. Air Quality Analysis Handbook: EMFAC 2007 (v2.3) Emission Factors. Available online: https://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/emfac-2007-(v2-3)-emission-factors-(on-road)

South Dakota Bat Working Group. 2004. South Dakota Bat Management Plan. Wildlife Division Report 2004-08. July 13, 2004. 97 pp. Available online: https://gfp.sd.gov/UserDocs/nav/bat-managment-plan.pdf

South Dakota Department of Agriculture and Natural Resources (SDDANR). 2024. Air Quality in South Dakota. SDDANR, Pierre, South Dakota. Accessed April 2024. Available online: https://danr.sd.gov/Environment/AirQuality/AirMonitoring/default.aspx

_____ 2022. The 2022 South Dakota Integrated Report for Surface Water Quality Assessment. Prepared by SDDANR, Pierre, South Dakota. March 25, 2022. Available online: https://danr.sd.gov/Conservation/WatershedProtection/ReportsPublications/SDDANR_2022_IR_approved.pdf

South Dakota Department of Revenue (SDDOR). 2022. Renewable Energy Facility (Wind & Solar). SDDOR, Pierre, South Dakota. October 2022. Available online: https://dor.sd.gov/media/riuhxv2u/renewable-energy-facility.pdf

South Dakota Department of Transportation (SDDOT). 2023. 2022 Vehicle Miles Travelled (VMT). All Vehicles by County. SD DOT, Office of Invenetory Management & Research, Pierre, South Dakota, in cooperation with U.S. Department of Transportation and Federal Highway Administration. June 27, 2023. Available online: https://dot.sd.gov/media/2022%20VMT%20By%20County%20All%20Vehicles.pdf

South Dakota Game, Fish and Parks (SDGFP). 2005. South Dakota Interior Least Tern (*Sterna antillarum athalassos*) and Piping Plover (*Charadrius melodus*) Management Plan. SDGFP, Wildlife division Report 2005-02.

_____ 2014. South Dakota Wildlife Action Plan. Wildlife Division Report 2014-03. SDGFP, Pierre, South Dakota. Available online: https://gfp.sd.gov/UserDocs/nav/SD_Wildlife_Action_Plan_Revision_Final.pdf

_____ 2018a. – State T&E Species Status Reviews Approved by SDGFP Commission on 5 April 2018. SDGFP, Pierre, South Dakota.

_____ 2018b. South Dakota Monarch Conservation and Management Stragegic Plan. SDGFP, Pierre, South Dakota. November 2018. Available online: https://gfp.sd.gov/userdocs/docs/SD_Monarch_Strategic_Plan_Nov_2018.pdf

_____ 2022. Management of Prairie Grouse in South Dakota. Wildlife Division Report Number 2022-11. SDGFP, Pierre, South Dakota. September 2022. Available online: https://gfp.sd.gov/UserDocs/docs/prairie_grouse_management.pdf

_____ 2023. List of Species of Greatest Conservation Need in South Dakota Wildlife Action Plan as of 1 March 2023. SDGFP, Pierre, South Dakota. March 1, 2023. 10 pp. Available online: https://gfp.sd.gov/UserDocs/nav/SD_SGCN_list_as_of_1_March_2023.pdf

_____ 2024a. South Dakota Environmental Review Tool. SDGFP, Pierre, South Dakota. Accessed April 2024. Available online: https://ert.gfp.sd.gov/content/map

_____ 2024b. Threatened and Endangered Species. SDGFP Conservation, Wildlife Diversity Program, Pierre, South Dakota. Accessed April 2024. Available online: https://gfp.sd.gov/threatened-endangered/

_____ 2024c. SGCN list for 2025 South Dakota Wildlife Action Plan Revision (last updated 19 Nov 2024). SDGFP, Pierre, South Dakota. Accessed January 2025. Available online: https://gfp.sd.gov/UserDocs/nav/SGCN_list_for_2025_SD_Wildlife_Action_Plan_Revision.pdf

Stahkecker, D.A. 1997a. Availability of Stopover Habitat for Migrant Whooping Cranes in Nebraska. Proceedings of the North American Crane Workshop 7: 132-140.

_____ 1997b. Predicting Availability of Stopover Roosting Habitat for Migrant Whooping Cranes in the Northern Great Plains. U.S. Fish and Wildlife Service (USFWS) Eagle Ecological Services. 21 pp.

State of South Dakota. 2019. State of South Dakota Governor's Budget Fiscal Year 2021. Our 131st Year of a Balanced Budget, State of South Dakota. December 3, 2019. Available online: https://bfm.sd.gov/budget/fy2021/SD_Rec_2021_entire.pdf

Strickland, D. 2004. Overview of Non-Collision Related Impacts from Wind Projects. In Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts, Washington, D. C. Prepared by RESOLVE, Inc. Washington D.C., Susan Savitt Schwartz, ed., September 2004. May 18-19, 2004.

Sullivan, R.G., L.B. Kirchler, T. Lahti, S. Roche, K.J. Beckman, B.L. Cantwell, and P. Richmand. 2012. “Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes.”. In Proceedings, National Association of Environmental Professionals, 37th Annual Conference, Portland, Oregon. May 21-24, 2021.

Taylor, D.A., R.W. Perry, D.A. Miller, and W.M. Ford. 2020. Forest Management and Bats. Publication of the White-nose Syndrome Response Team, Hadley, Massachusettes.

Tetra Tech, Inc. 2024. Shadow Flicker Impact Analysis for the Campbell County Wind Project, Campbell County, South Dakota. Prepared for Campbell County Wind Farm 2, LLC. Prepared by Tetra Tech, Inc. May 2024.

The Paleontology Portal. 2024. The Cretaceous in South Dakota, US. Produced by the University of California Museum of Paleontology, the Paleontological Society, the Society of Vertebrate Paleontology, and the US Geological Survey. Accessed June 2024. Available online: http://paleoportal.org/index.php?globalnav=time_space&sectionnav=state&state_id=40&period_id=18

Urbanek, R.P. and J.C. Lewis. 2020. Whooping Crane (*Grus Americana*), Version 1.0. *In*: A. F. Poole, ed. Birds of the World. Cornell Lab of Ornithology, Ithaca, New York. doi: 10.2173/bow.whocra.01. Available online: http://birdsoftheworld.org/bow/species/whocra/cur/

U.S. Army Corps of Engineers (USACE). 1987. 1987 Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1 (on-line edition). Wetlands Research Program. Prepared by Environmental Laboratory, USACE, Vicksburg, Mississippi. January 1987. Available online: https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4532/

_____ 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region. (Version 2.0). ERDC/EL TR-10-1. Wetlands Regulatory Assistance Program, USACE, Vicksburg, Mississippi. March 2010. Available online: https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7613

U.S. Bureau of Labor and Statistics. 2024. Home Page. U.S. Bureau of Labor Statistics, Department of Labor Washington, D.C. Accessed April 2024. U.S. Bureau of Labor and Statistics. 2024. Home Page. U.S. Bureau of Labor Statistics, Department of Labor Washington, D.C. Accessed April 2024. Available online: https://www.bls.gov/data/inflation_calculator.htm

U.S. Census Bureau (USCB). 2024a. Explore Census Data. USCB, Washington, D.C. Accessed April 2024. Available online: https://data.census.gov/cedsci/

_____ 2024b. Quickfacts: Campbell County, South Dakota. USCB. Accessed April 2024. Available online: https://www.census.gov/quickfacts/fact/table/campbellcountysouthdakota,SD

U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS). 2019. 2017 Census of Agriculture County Profile: Campbell County, South Dakota. USDA NASS. May 24, 2019. Available online: https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/South_Dakota/cp46021.pdf

____ Natural Resources Conservation Service (NRCS). 2021. SSURGO Soils Data. Soil Survey Geographic (SSURGO) Database, Web Soil Data, NRCS USDA Soil Survey Staff, Washington, D.C. Accessed October 2023. Available online: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053631

U.S. Department of Energy (DOE). 2018. Wind Turbines in Extreme Weather: Solutions for Hurricane Resiliency. DOE, Office of Energy Efficiency & Renewable Energy, Washington, D. C. January 23, 2018. Accessed April 2024. Available online: https://www.energy.gov/eere/articles/wind-turbines-extreme-weather-solutions-hurricane-resiliency

____ 2023. Land-Based Wind Market Report: 2023 Edition. Office of Energy Efficiency and Renewable Energy, USDOE, Washington, D.C. 96 pp. Available online: https://www.energy.gov/sites/default/files/2023-08/land-based-wind-market-report-2023-edition.pdf

U.S. Environmental Protection Agency (USEPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. USEPA, Office of Noise, Abatement and Control. March 1974. Available online: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF

_____ 1992. EMF in Your Environment. Magnetic Field Measurements of Everyday Electrical Devises. USEPA, Washington, D. C. December 1992. Available online: https://nepis.epa.gov/Exe/ZyPDF.cgi/000005EP.PDF?Dockey=000005EP.PDF

_____ 2012. Level III and Level IV Ecoregions of South Dakota. Ecoregions of the United States. USEPA Office of Research and Development - National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. April 26, 2012. Accessed February 2023. Available online: https://www.epa.gov/eco-research/ecoregion-download-files-state-region-8#pane-39

_____ 2015. NSPS for GHG Emissions from New, Modified, and Reconstructed Electric Utility Generating Units - Rule Summary. Available online: https://www.govinfo.gov/content/pkg/FR-2015-10-23/pdf/2015-22837.pdf

_____ 2013. Level III and Level IV Ecoregions of the Continental United States. Ecosystems Research, USEPA. April 16, 2013. Accessed April 2024. Available online: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states

_____ 2022. NAAQS Designations Process. Available online: https://www.epa.gov/criteria-air-pollutants/naaqs-designations-process

_____ 2023a. 40 Code of Federal Regulations (CFR) Part 60. New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule. Proposed Rule. 88 Federal Register (FR) 33240: 33240-33420. May 23, 2023. Available online: https://www.federalregister.gov/documents/2023/05/23/2023-10141/new-source-performance-standards-for-greenhouse-gas-emissions-from-new-modified-and-reconstructed

_____ 2024a. Reviewing National Ambient Air Quality Standards (NAAQS): Scientific and Technical Information. USEPA, Washington, D. C. Accessed April 2024. Available online: https://www.epa.gov/naaqs

_____ 2024b. Greenhouse Gas Equivalencies Calculator. USEPA, Energy and Environment. Last Updated January 2024. Accessed December 2024. Available online: https://www.epa.gov/ energy/greenhouse-gas-equivalencies-calculator

_____ 2024c. AVERT Web Edition. USEPA, Energy and Environment. Last Updated July 2024. Accessed December 2024. Available online: https://www.epa.gov/avert/avert-web-edition

U.S. Fish and Wildlife Service (USFWS). 2007. Whooping Cranes and Wind Farms - Guidance for Assessment of Impacts. Draft July 1, 2007.

_____ 2009. Whooping Cranes and Wind Development - an Issue Paper. Regions 2 and 6, USFWS. April 2009. Available online: https://ecos.fws.gov/ServCat/DownloadFile/168680?Reference=114480

_____ 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Frontmatter + 103 pp. Available online: https://www.fws.gov/sites/default/files/documents/eagle-conservation-plan-guidance.pdf

_____ 2014. Revised Recovery Plan for the Pallid Sturgeon (*Scaphirhynchus albus*). USFWS Mountain-Prairie Region, Denver, Colorado. Available online: https://www.fws.gov/node/68860 _____ 2015. Northern Long-Eared Bat (*Myotis septentrionalis*) Fact Sheet. USFWS, Washington, D.C. April 2015. Available online: https://www.fws.gov/sites/default/files/documents/ 508_NLEB%20fact%20sheet.pdf

_____ 2020a. Range-Wide Indiana Bat Survey Guidelines. March 2020. 65 pp.

_____ 2020b. U.S. Fish and Wildlife Service, Region 6, Wildlife Buffer Recommendations for Wind Energy Projects. USFWS, Washington, D.C. January 14, 2020. 3 pp. Available online: https://www.fws.gov/guidance/sites/default/files/documents/USFWS%20R6%20%20Buffer%20Recommendations%20for%20wind%20energy%20projects_14%20Jan%202020.pdf

_____ 2020b. Monarch (*Danaus plexippus*) Species Status Assessment Report. Version 2.1. USFWS, Washington, D.C. September 2020. 96 pp + appendices. Available online: https://www.fws.gov/sites/default/files/documents/Monarch-Butterfly-SSA-Report-September-2020.pdf

_____ 2021a. Birds of Conservation Concern 2021. USFWS Migratory Birds, Falls Church, Virginia. April 2021. Available online: https://tethys.pnnl.gov/sites/default/files/publications/birds-of-conservation-concern-2021.pdf

_____ 2021b. Draft Recovery Plan for the Rufa Red Knot (*Calidris Canutus Rufa*). USFWS, North Atlantic-Appalachian Region, Hadley, Massachusetts. 21 pp.

_____ 2021c, 2024b,2025. Initial Project Scoping: Ipac - Information for Planning and Consultation. IPaC, Environmental Conservation Online System, USFWS, Washington, D.C. Available online: https://ipac.ecosphere.fws.gov/

_____ 2021d. U.S. Fish and Wildlife Service (USFWS), Region 6 Wildlife Buffer Recommendations for Wind Energy Projects. Version 3.0. March 31, 2021. 3 pp.

_____ 2022. Species Status Assessment Report for the Northern Long-Eared Bat (*Myotis septentrionalis*). Version 1.1. USFWS, Great Lakes Region, Bloomington, Minnesota. March 22, 2022. Available online: https://www.fws.gov/media/species-status-assessment-report-northern-long-eared-bat

_____ 2023a. USFWS Threatened & Endangered Species Active Critical Habitat Report. Environmental Conservation Online System, USFWS, Washington, D.C. Last updated March 23, 2023. Accessed April 2024. Available online: https://ecos.fws.gov/ecp/report/table/critical-habitat.html

_____ 2023b. Species Status Assessment for Regal Fritillary (*Argynnis (Speyeria) idalia*): Eastern Subspecies (*Argynnis idalia idalia*) and Western Subspecies (*A. i. occidentalis*). Version 1.0. Prepared by USFWS South Dakota Ecological Services Field Office, Pierre, South Dakota. September 25, 2023. 179 pp. + appendices. Available online: https://ecos.fws.gov/ServCat/DownloadFile/253168

_____ 2024a. Migratory Bird Program Administrative Flyways. USFWS, Washington, D.C. Accessed April 2024. Available online: https://www.fws.gov/partner/migratory-bird-program-administrative-flyways

_____ 2024c. Endangered and Threatened Wildlife and Plants; Endangered Status for the Eastern Regal Fritillary, and Threatened Status with Section 4(d) Rule for the Western Regal Fritillary. 50 Code of Federal Regulations (CFR) Part 17. Department of the Interior, Fish and Wildlife Service. August 6, 2024. 74 pp. Available online: https://public-inspection.federalregister.gov/2024-16982.pdf?utm_campaign=pi+subscription+mailing+list&utm_medium=email&utm_source=federalregister.gov

_____ 2024d. Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Monarch Butterfly and Designation of Critical Habitat. 50 Code of Federal Regulations (CFR) Part 17. Department of the Interior, Fish and Wildlife Service. December 12, 2024. 74 pp. Available online: https://www.govinfo.gov/content/pkg/FR-2024-12-12/pdf/2024-28855.pdf

_____ 2024e. Northern Long-Eared Bat (*Myotis septentrionalis*). Species Profile. Environmental Conservation Online System, USFWS, Washington, D.C. Accessed March 2024. Available online: https://ecos.fws.gov/ecp/species/9045

_____ 2024f. Piping Plover (*Charadrius melodus*). FWS Focus. USFWS, Washington, D.C. Accessed April 2024. Available online: https://www.fws.gov/species/piping-plover-charadrius-melodus

_____ 2024g. Pallid Sturgeon (*Scaphirhynchus albus*). FWS Focus. USFWS, Washington, D.C. Accessed Novmeber 2024. Available online: https://www.fws.gov/species/pallid-sturgeon-scaphirhynchus-albus

_____ 2024h. Western Regal Fritillary (*Speyeria idalia*). FWS Focus. USFWS, Washington, D.C. Accessed Novmeber 2024. Available online: https://www.fws.gov/species/regal-fritillary-speyeria-idalia

_____ 2024i. Monarch (*Danaus plexippus*). FWS Focus. USFWS, Washington, D.C. Accessed Novmeber 2024. Available online: https://www.fws.gov/species/monarch-danaus-plexippus

_____ 2024j. Whooping Crane (*Grus Americana*). Species Profile. Environmental Conservation Online System, USFWS, Washington, D.C. Accessed April 2024. Available online: https://ecos.fws.gov/ecp/species/758

_____ National Wetlands Inventory (NWI). 2024k. Wetlands Mapper. USFWS NWI, Baileys Crossroads, Virginia. Accessed April 2024. Available online: https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper

_____ 2024l. Species status assessment report for the Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*), Version 1.0. August 2024. Alaska Region. 131 pp.

_____ 2024m. Land-based Wind Energy Voluntary Operational Avoidance Guidance for the Northern Long-eared Bat (*Myotis septentrionalis*). Accessed November 2024. Available at: https://www.fws.gov/sites/default/files/documents/2024-10/nleb-wind-operational-avoidance-guidance_508.pdf

_____ 2024n. Land-based Wind Energy Voluntary Avoidance Guidance for the Northern Long-eared Bat: Frequently Asked Questions (FAQ) Supplement. Accessed November 2024. Available at: https://www.fws.gov/sites/default/files/documents/2024-03/draft-nleb-faq-wind-avoidance-guidance.pdf.

U.S. Geological Survey, Berkeley Lab, and American Wind Energy Association. 2023. U.S. Wind Turbine Database. Interactive Map. Database release Novemeber 2023. Accessed April 2024. Available online: https://eerscmap.usgs.gov/uswtdb/

U.S. Geological Survey (USGS). 2016. Prospect- and Mine-Related Features on USGS Topographic Maps. USGS, ScienceBase-Catalog. Accessed February 2024. Available online: https://mrdata.usgs.gov/usmin/

_____ 2021. National Climate Change Viewer (NCCV). USGS, Data Analysis Tools. Last Updated June 22, 2021. Accessed April 2024. Available online: https://www.usgs.gov/tools/national-climate-change-viewer-nccv

____ 2024a. Mineral Resources Data System (Mrds). USGS, Reston, Virginia. Accessed April 2024. Available online: https://mrdata.usgs.gov/mrds/

____ 2024b. The National Map. TNM Download V2.0. Topo Map data, 3DEP products, Lidar, lfSAR, NHD (Hydrography Dataset), NAIP Plus Imagery, National Structures Dataset. Accessed April 2024. Available online: https://apps.nationalmap.gov/downloader/#/

____ 2024c. What Are Sedimentary Rocks? Frequently Asked Questions, USGS. Accessed April 2024. Available online: https://www.usgs.gov/faqs/what-are-sedimentary-rocks

_____ Gap Analysis Program (GAP). 2022. PAD-US Data Download. USGS GAP. Last updated July 5, 2022. Accessed April 2023. Available online: https://www. usgs.gov/programs/gap-analysis-project/science/pad-us-data-download

_____ National Hydrography Dataset (NHD). 2022, 2023. National Hydrography Dataset. National Hydrography, USGS, Reston, Virginia. Available online: https://www.usgs.gov/national-hydrography/national-hydrography-dataset

U.S. Global Change Research Program (USGCRP). 2018. Fourth National Climate Assessment. Chapter 21: Midwest. USGCRP, Washington, D.C. Accessed April 2024. Available online: https://nca2018.globalchange.gov/chapter/21/

U.S. North American Bird Conservation Initiative (NABCI). 2021. Bird Conservation Regions Map. NABCI. Accessed April 2021. Available online: https://nabci-us.org/resources/bird-conservation-regions-map/

Wanner, G. A., R. A. Klumb, W. J. Stancill, and G. R. Jordan. 2007 Habitat Use and Movements of Adult Pallid Sturgeon in the Missouri River Downstream of Fort Randall Dam, South Dakota and Nebraska. Proceedings of the South Dakota Academy of Science, Vol. 86.

Western Area Power Administration (WAPA). 2015. Final Environmental Assessment, Campbell County Wind Farm, Campbell County, South Daota. DOE/EA 1955. Prepared by WAPA Upper Great Plains Region. June 2015. Available online: https://www.wapa.gov/wp-content/uploads/2023/04/CampbellCtyWindFinalEA.pdf

_____ and U.S. Fish and Wildlife Service (USFWS). 2015. Upper Great Plains Wind Energy Programmatic Environmental Impact Statement. DOE/EIS-0408. WAPA and USFWS. Available online: https://www.wapa.gov/about-wapa/regions/ugp/environment/programmaticwindeis/

Western EcoSystems Technology, Inc. (WEST). 2023a. Draft Bird and Bat Conservation Strategy Campbell County Wind Farm 2 Project Campbell County, South Dakota. Confidential report prepared for ConEdison Clean Energy Business, Sioux Falls, South Dakota. December 2, 2023.

_____ 2023b. Regional Summaries of Wildlife Fatalities at Wind Facilities in the United States and Canada: 2022 Report from the Renew Database. WEST, Cheyenne, Wyoming. July 1, 2023. Available online: https://connect.west-inc.com/Renew/RenewReport2022.html

WINDExchange. 2024a. South Dakota Land-Based Wind Speed at 100 Meters. WINDExchange, U.S. Deparment of Energy, Office of Energy Efficiency & Renewable Energy. Accessed April 2024. Available online: https://windexchange.energy.gov/maps-data/384

_____ 2024b. Wind Energy Projects and Shadow Flicker. WINDExchange, Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy. Accessed April 2024. Available online: https://windexchange.energy.gov/projects/shadow-flicker

Wyle Laboratories. 1971. Community Noise. Prepared by Wyle Laboratories. Prepared for U.S. Environmental Protection Agency, Office of Noise, Abatement and Control, Washington, D. C. December 31, 1971. Available online: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000PKUG.PDF?Dockey=2000PKUG.PDF

Xerces Society for Invertebrate Conservation. 2023. Characterization of Western Bumble bee (*Bombus occidentalis*) nesting habitat and management recommendations to conserve bumble bee nests. Available online at: https://xerces.org/sites/default/files/publications/Western%20Bumble%20Bee%20Nesting%20Habitat%20and%20Management%20Recommendations.pdf.

Xerces Society for Invertebrate Conservation. 2025. Great Plains Bumble bee atlas. Accessed online January 23, 2025 at: https://www.bumblebeeatlas.org/.

Appendix A. Best Management Practices and Conservation Measures

Appendix B. Scoping and Draft EA Comment-Response Matrix

Appendix C. Campbell County Wind Farm 2 Wetland and Waterbody Delineation Report

Appendix D. Biological Reports

Appendix E. Wildlife Conservation Strategy

Appendix F. Species Consistency Evaluation Forms

Appendix G. Whooping Crane Operational Monitoring Plan

Appendix H. Campbell County Wind Farm 2 Noise Assessment

Appendix I. Campbell County Wind Farm 2 Shadow Flicker Analysis

Appendix J. Microwave Study

Appendix K. IPaC Resource List

Appendix L. Scoping and Draft EA Notification Documents