Pronghorn Flats

115-kilovolt Project

Draft Environmental Assessment

Kimball and Banner Counties, Nebraska, and Goshen County, Wyoming

Western Area Power Administration

DOE/EA-2139

March 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
°	degree
AADT	annual average daily traffic
AFB	Air Force Base
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
BBCS	Bird and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practice
BUL	Biologically Unique Areas
CEQ	Council on Environmental Quality
CERT	Conservation and Environmental Review Tool
CFR	Code of Federal Regulations
CR	County Road
CRI	credible Interval
CRM	collision risk model
CWA	Clean Water Act of 1972
dBA	decibels
DOE	Department of Energy
EA	environmental assessment
ECPG	Eagle Conservation Plan Guidance
EIS	environmental impact statement
EMF	electric and magnetic fields
EMU	Eagle Management Unit
ESA	Endangered Species Act of 1973
F	Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
ft	foot/feet
GE	General Electric
GHG	greenhouse gas
HAP	hazardous air pollutants
Hwy	Highway
I-80	Interstate 80
ICNIRP	International Commission on Non-ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
IPaC	Information for Planning and Consultation System
KOP	Key Observation Points
kV	kilovolt
L_{1h}	1-hour equivalent sound level
LAP	Local Area Population
Longspur	thick-billed longspur
MBTA	Migratory Bird Treaty Act
met	meteorological
mG	milliGauss
mi	mile
mi^2	Square mile
mph	miles per hour

Acronym	Meaning
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEDEQ	Nebraska Department of Environmental Quality
NEDOT	Nebraska Department of Transportation
NEPA	National Environmental Policy Act of 1969
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act of 1966
NIEHS	National Institute of Environmental Health Sciences
NNHP	Nebraska Natural Heritage Program
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O&M	operations and maintenance
OATT	Open Access Transmission Tariff
Orchid	western prairie fringed orchid
Orion	Orion Wind Resources LLC
OST	Oglala Sioux Tribal
PEM	palustrine emergent
PM	particulate matter
Project	Pronghorn Flats 115-kV Project
PRRIP	Platte River Recovery Implementation Program
ROW	right-of-way
RSG	RSG, Inc.
SDWA	Safe Drinking Water Act
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Offices
SPCC	Spill Prevention, Control, and Countermeasures
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
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 compounds
WAPA	Western Area Power Administration
WEST	Western EcoSystems Technology, Inc.
WGFD	Wyoming Game and Fish Department
WYDEQ	Wyoming Department of Environmental Quality
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database

1.0 INTRODUCTION

Orion Wind Resources, LLC (Orion), has requested an interconnection agreement with Western Area Power Administration (WAPA) to allow a planned wind energy project to transmit electricity to a WAPA switchyard (the point of interconnection) and into the WAPA electric grid system. Orion, the Applicant, or a subsidiary or affiliate, plans to construct and operate the Pronghorn Flats 115-kilovolt (kV) Project (Project) in southwest Banner and northwest Kimball counties, Nebraska, and southeast Goshen County, Wyoming (Figure 1-1).

The Project is a stand-alone component of Orion's larger Pronghorn Flats Wind Farm Complex, which includes a second wind-energy project connecting at 230-kV. Orion has requested an interconnection agreement with WAPA for each of these projects. Orion's requests for two interconnections with WAPA's transmission system for the Pronghorn Flats Wind Farm Complex requires evaluation of each Project by WAPA in compliance with the National Environmental Policy Act of 1969 (NEPA). The projects are considered separate because each would interconnect to different WAPA transmission lines under separate interconnection agreements and could be built and operated independent of each other. The 230-kV project may be evaluated in a separate NEPA process when it is further along in development.

WAPA is a federal, power-marketing agency within the U.S. Department of Energy (DOE). WAPA operates and maintains electric transmission lines and associated facilities in accordance with its statutory duties, good utility practice and its Open Access Transmission Tariff (OATT). Under the OATT, WAPA offers an interconnection agreement to deliver electricity on its transmission system when capacity is available. WAPA offers interconnection to all eligible customers on a first-come, first-served basis, with a final decision based on technical system impact and feasibility studies and an environmental assessment (EA) or Environmental Impact Statement (EIS) that is compliant with the NEPA.

The Project includes construction of 30 to 48 wind turbines, producing between 2.5 and 4.2 megawatts (MW) each, plus access roads, electric collection system, substation, a fiber optics communication system, operations and maintenance (O&M) facilities, meteorological (met) towers, a 115-kV transmission line, a switchyard that serves as the point of interconnection with WAPA's transmission system, and related facilities and equipment. The interconnection agreement would permit the Project's 115-kV transmission line to connect and deliver energy produced by the wind energy facility into WAPA's Round Top–Stegall segment of the Stegall-Archer 115-kV transmission line for distribution to project customers (Figure 1-1). The indicative locations of certain Project facilities are shown in Figures 1-1 and 1-2.

This EA was prepared according to the Council on Environmental Quality's (CEQ's) 1978 regulations for implementing the procedural provisions of the NEPA (40 Code of Federal Regulations [CFR] §§1500–1508 [1970], as amended). The CEQ issued revised regulations for implementing the procedural provisions of the NEPA, effective September 14, 2020. The revised regulations, which are under review consistent with the Executive Order 13990 *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis,* provide the responsible official the option of conducting an environmental review under the 1978 regulations if the process was initiated prior to September 14, 2020 (40 CFR §1506.13 [1978], 85 Federal Register 137, p. 43,373, July 16, 2020). The public scoping process for this Project was initiated on March 26, 2020, prior to the implementation of the revised NEPA regulations, so this EA was prepared in accordance with the 1978 regulations.

1.1 Purpose and Need for Federal Action

WAPA needs to consider and respond to Orion's interconnection request in accordance with its OATT. The OATT contains terms for processing requests for the interconnection of generation facilities to WAPA's transmission system. In reviewing interconnection requests, WAPA must ensure that existing reliability and services are not degraded. The OATT provides for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies identify system upgrades or additions necessary to accommodate a proposed project and address whether the upgrades or additions are within a project's scope. Under WAPA's OATT, WAPA offers interconnection to all eligible customers on a first-come, first-served basis, with a final decision whether to make this offer subject to the system impact studies and an environmental review under the NEPA.

1.2 Orion's Goals and Objectives

Orion's goals and objectives for the proposed Project are to provide a reliable and cost-effective source of renewable energy to energy users. To accomplish these goals and objectives, the Project must be technically, environmentally, and economically feasible. To that end, Orion needs at least the following factors to be present:

- A reliable wind resource
- Landowners willing to participate in the Project
- Ecological conditions allowing the Project to comply with applicable environmental regulations at a relatively reasonable cost
- A generator interconnection agreement with WAPA to transmit power to a power purchaser
- A customer to purchase the power that is generated by the Project

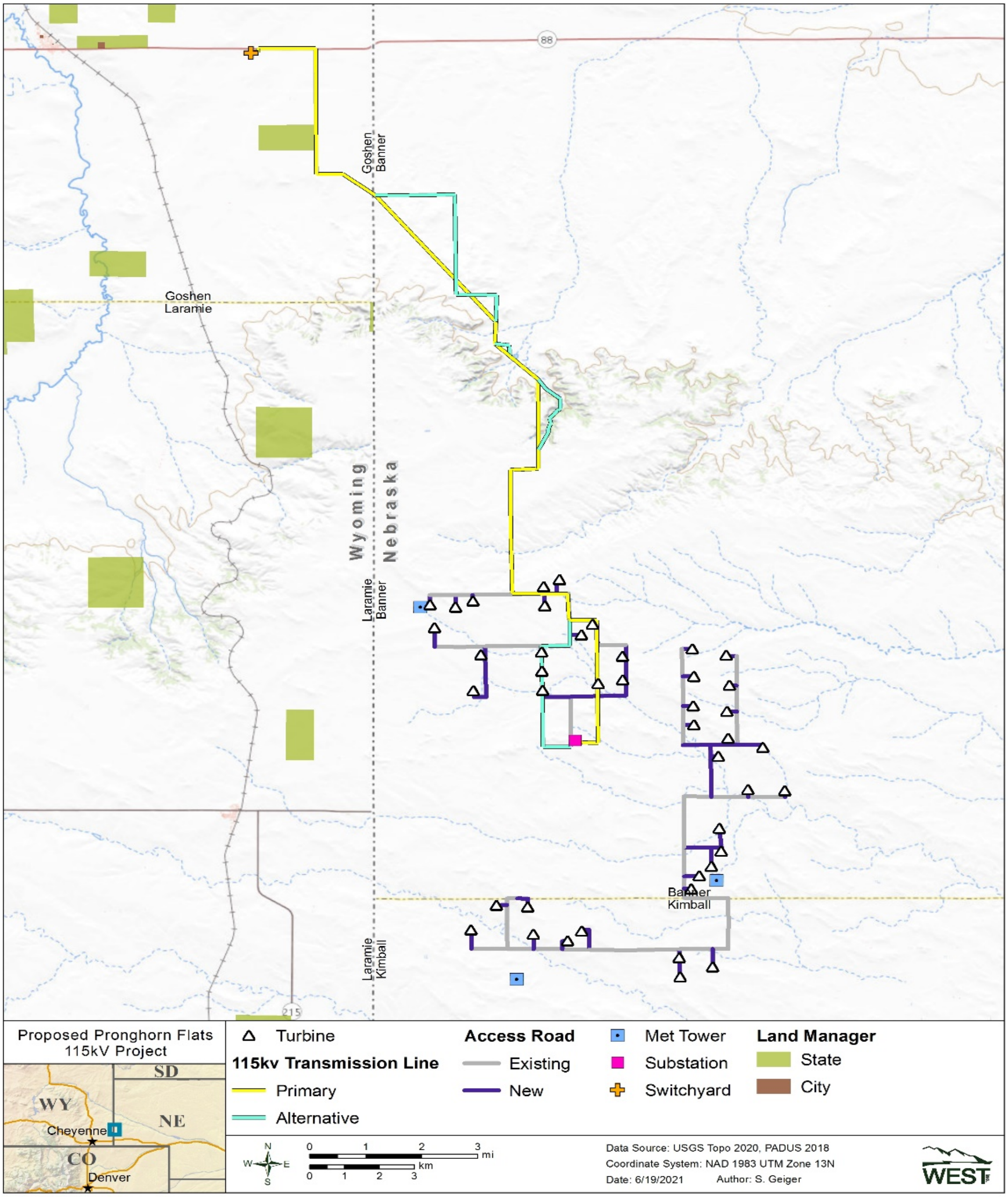

Figure 1-1. Overview of the Indicative Pronghorn Flats 115-kilovolt Project in Banner and Kimball counties, Nebraska, and Goshen County, Wyoming.

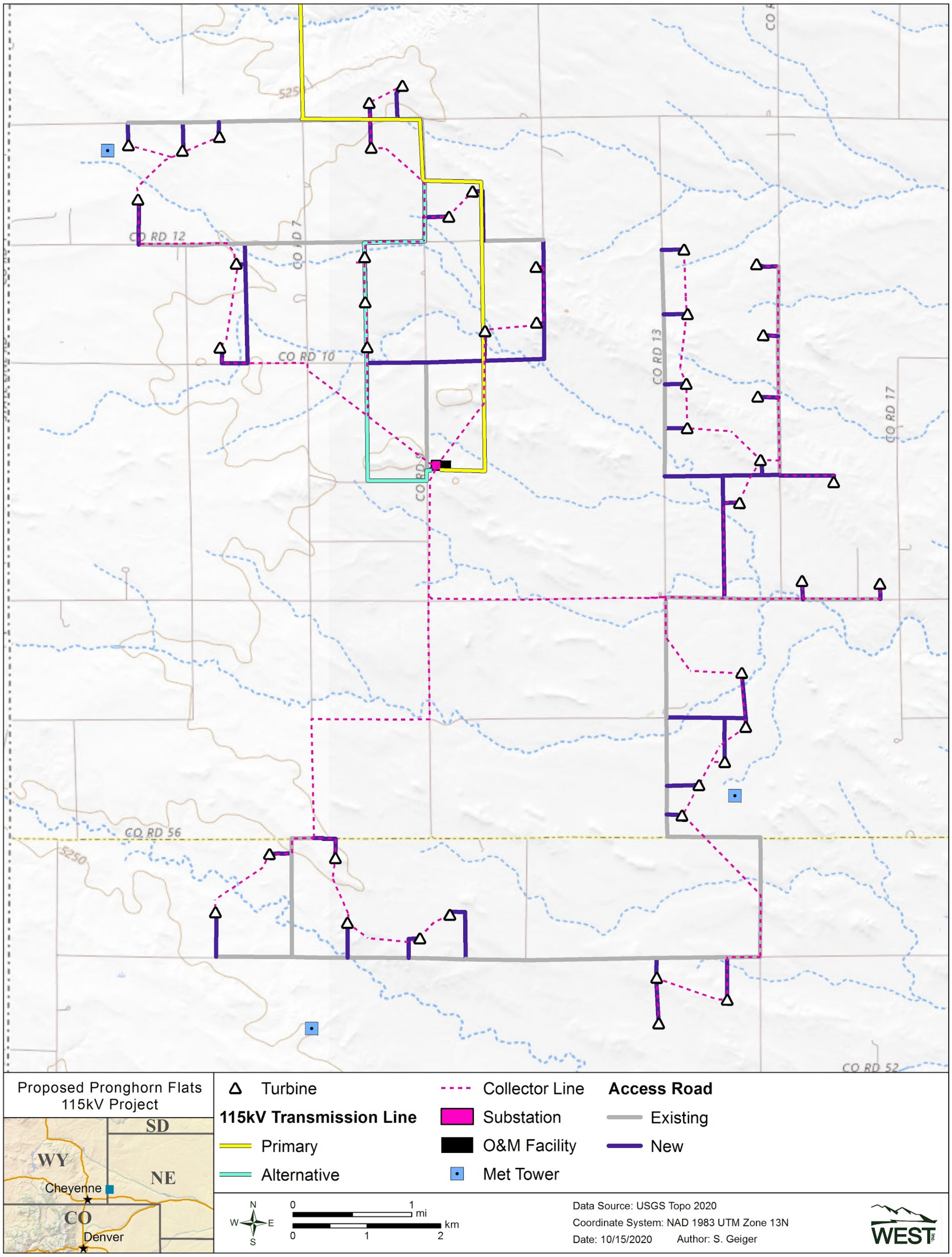

Figure 1-2. Indicative infrastructure layout for the Pronghorn Flats 115-kilovolt Project, Banner and Kimball counties, Nebraska.

2.0 DESCRIPTION OF PROPOSED ACTION AND NO-ACTION ALTERNATIVES

2.1 Proposed Action

2.1.1 Western Area Power Administration Proposed Action

WAPA's Proposed Action consists of approving the interconnection request, entering into an interconnection agreement and operating a new switchyard to facilitate and complete the physical interconnection of the Project to WAPA's transmission system.

2.1.2 Orion's Proposed Project

Orion's Proposed Project consists of construction, O&M, and decommissioning of the Project's wind turbines and associated infrastructure, the 115-kV transmission line, and the switchyard for interconnection to the WAPA transmission line system. (Figures 1-1 and 1-2).

<u>2.1.2.1 Project Location</u>

The turbines would be located on privately owned lands within Banner and Kimball counties, Nebraska (Figures 1-1 and 1-2). The 115-kV transmission line would be located on private land in Banner and Kimball counties, Nebraska, and Goshen County, Wyoming, and potentially within Banner County Road (CR) right-of-way (ROW; Figures 1-1 and 1-2). Road crossing agreements from Banner and Kimball counties, Nebraska Department of Transportation (NEDOT), and Wyoming Department of Transportation (WYDOT) would need to be acquired (Figures 1-1 and 1-2). The 115-kV transmission line would terminate at a switchyard constructed to interconnect the Project to the Round Top–Stegall segment of the Stegall-Archer 115-kV transmission line (Figure 1-1). Orion currently holds or is in late-stage discussions for land agreements with all of the landowners with proposed turbine locations and along the primary and alternative 115-kV transmission line routes.

<u>2.1.2.2 Construction</u>

The construction phase of the Project would require approximately nine to 14 months. The construction phase is expected to provide about 80 to 150 construction jobs. Water required for the concrete needed for the foundations of the turbines is estimated at one million gallons. Additional water would be needed for dust suppression on roads during construction and is estimated at 40,000 gallons/day. The contractor for construction would obtain temporary water sources from either landowners with wells or purchase water from the county or other water authorities. The estimated construction cost is between roughly $115 million and $125 million. Construction activities are expected to be in the following sequence:

- Orion would enter into road use agreements with the counties prior to commencing any construction activities

- Heavy equipment would arrive on site and commence preparation of a laydown area, road construction, and turbine foundations
- Turbines would be erected and connected via underground cables. Electric commissioning can take approximately two months after erection is complete
- Orion would complete the construction with site reclamation and restoration, including repairing roads pursuant to the road use agreements
- Best Management Practices (BMP) would be implemented to minimize impacts from Project construction. The BMPs are discussed in Section 2.2, Environmental Conservation Measures and Best Management Practices

2.1.2.3 Operation and Maintenance

The Project would operate for approximately 30 years with the possibility of extensions up to an additional 20 years. Maintenance activities would occur as necessary throughout the life of the Project. Any earth-disturbing activities would be scheduled to occur primarily April to November or when weather conditions allow. Operation and maintenance BMPs are discussed in Section 2.2, Environmental Conservation Measures and Best Management Practices.

2.1.2.4 Decommissioning

The Project is expected to operate approximately 30 years with the possibility of extensions up to an additional 20 years. Decommissioning would require approximately 12 to 18 months. General steps for decommissioning a wind farm include:

- Establishing temporary storage areas for dismantled components and other materials for recycling
- All turbines (including towers) would be dismantled and recycled, sold for scrap, or disposed of offsite
- Electric control devices would be recycled or disposed
- Transformers and other control devices would be sold, refurbished, or disposed
- Turbine foundations below approximately 3.5 feet (ft) and below-ground collector lines would likely remain in place
- On-site access roads, rock or gravel at the substation, and building foundations would be removed and recycled, except that access roads may remain in place if desired by landowners
- Disturbed land areas covered in rock or gravel and building/tower footprints would be restored to original grade

- Dismantlement of turbine towers, electric substations, and storage buildings would be inspected for industrial contamination and, if necessary, decontamination procedures would be followed
- BMPs are discussed in Section 2.2, Environmental Conservation Measures and Best Management Practices

2.1.2.5 Project Facilities and Components

Project facilities and components include the turbines, access roads, underground fiber-optic communication cables, electric collector lines, Project substation, met towers, O&M facilities, a 115-kV transmission line and structures, and a switchyard (Figures 1-1 and 1-2). Orion located the Project facilities and components for the indicative layout to avoid or reduce potential impacts to military, cultural and tribal, wetland, avian, visual, and vegetative resources and sound receptors to the greatest extent practicable while still keeping the Project commercially viable. Project facilities and components are discussed below and Table 2-1 summarizes their temporary and long-term footprint for the indicative layout. The values for the temporary footprint include the actual facility or component size plus an additional area to accommodate construction or decommissioning activities. The long-term footprints represent the anticipated dimension of each facility or component that would remain after construction. All Project facilities and components would be designed, built, and operated in compliance with federal, state, and local regulations, National Electrical Safety Code standards, and other applicable industry standards.

Changes to the indicative layout may be necessary during final design for various reasons, including geotechnical and environmental evaluation results, landowner input, military needs, or to avoid newly identified cultural or tribal resources. Orion anticipates that changes could include up to five additional turbines and potentially an increase of up to 25% in additional infrastructure that would increase the temporary and long-term impacts accordingly (Table 2-2). Orion has committed to doing additional biological and cultural surveys prior to construction for any infrastructure deviating from the temporary or long-term footprints for the indicative layout as defined in Table 2-1.

Table 2-1. Estimated footprint for the Pronghorn Flats 115-kilovolt Project based on the indicative layout.

Project Component	Assumptions	Construction & Decommissioning Footprint (Temporary)		Operational Footprint (Long Term)	
		Dimensions	Total Acreage	Dimensions	Total Acreage
Wind Facility					
Turbines	43 turbines	223-ft radius	154.2 acres (3.6 acres per turbine)	26-ft radius	2.10 acres (0.05 acre per turbine)

Table 2-1. Estimated footprint for the Pronghorn Flats 115-kilovolt Project based on the indicative layout.

Project Component	Assumptions	Construction & Decommissioning Footprint (Temporary)		Operational Footprint (Long Term)	
		Dimensions	**Total Acreage**	**Dimensions**	**Total Acreage**
Access roads for wind farm	Up to 38.7 miles. Approximately 16.4 miles of new roads and 22.2 miles of existing roads	50-ft wide	234.3 acres	16-ft wide	75 acres
O&M facility	One O&M facility	467 ft X 467 ft	5.0 acres	467 ft X 467 ft	5.0 acres
Electric collector lines	Up to 35.9 miles	15-ft wide	68 acres	--	--
Fiber optics communication cables	Up to 35.9 miles	Captured in the electric collector line footprint because the two systems will share the same trench.			
Meteorological (met) towers	3 met towers	1,000 ft^2 per tower	<0.100 acre (0.023 acre per tower)	25 ft^2 per tower; if guy-wires installed, 250-ft radius	<0.1000 acre (0.0006 acre per tower); guy-wires: 13.5 acre (4.5 acres per tower)
met tower connection to the nearest turbine or collector lines	Met tower 1 Met tower 2 Met tower 3	15-ft wide 15-ft wide 15-ft wide	1.63 0.58 0.33	--	--
Substation	One substation location	511 ft X 511 ft	6.0 acres	511 ft X 511 ft	6.0 acres
Subtotal Infrastructure Components[1]		**–**	**422 acres**	**–**	**88 acres**
Electric Transmission System					
115-kV transmission line	20 miles for the primary route; 21.3 miles for the alternative route	150-ft wide	349 acres for primary route; 387 acres for alternative route	100 ft easement as needed for maintenance activities	--
Structure	One structure spaced generally every 450 ft, estimated 226 structures for the primary route, 250 for the alternative route	This temporary footprint would be captured in the transmission line route corridors above		Structure radius is about 2.5 ft at base.	0.10–0.12 acre

Table 2-1. Estimated footprint for the Pronghorn Flats 115-kilovolt Project based on the indicative layout.

Project Component	Assumptions	Construction & Decommissioning Footprint (Temporary)		Operational Footprint (Long Term)	
		Dimensions	Total Acreage	Dimensions	Total Acreage
Switchyard	One switchyard	430 ft X 430 ft	4.3 acres	430 ft X 430 ft	4.3 acres
Subtotal 115-kV Transmission Line [1]		**--**	**353–391 acres**	**--**	**4.3 acre**

[1] This subtotal is a sum of each 115-kilovolt (kV) Project component's footprint. Some components will overlap. This subtotal has not been adjusted for these overlapping components. Therefore, this subtotal overstates the Project disturbance.

ft = foot/feet, ft^2 = square feet, O&M = operations and maintenance.

Table 2-2. Potential estimated footprint associated with five additional wind turbines and up to a 25% increase in associated infrastructure for the Pronghorn Flats 115-kilovolt Project.

Project Component	Assumptions	Construction & Decommissioning Footprint (Temporary)	Operational Footprint (Long Term)
		acres	acres
Wind Facility			
Turbines	5 additional turbines	54	0.75
Access roads for wind farm	Up to 4.1 additional miles of new roads and 5.5 additional miles of existing roads	58.1	18.7
Electric collector lines	Up to 9 additional miles	16.3	
Fiber optics communication cables	up to 9 additional miles	Captured in the electric collector line footprint as the trench is shared	
Meteorological towers	up to 1 additional met tower	0.023	<0.1
Electric Transmission System			
115-kV transmission line	Up to 5 additional miles	91	--
Structure	Up to an additional 12 structures	This temporary footprint would be captured in the transmission line route corridors above	<0.1
Total potential additional footprint[1]		**224.9**	**19.5**

[1] This total is a sum of each 115-kilovolt (kV) Project component's footprint. Some components will overlap. This subtotal has not been adjusted for these overlapping components. Therefore, this subtotal overstates the Project disturbance.

2.1.2.5.1 Wind Turbines

The Project would consist of 30 to 48 wind turbines producing between 2.5 and 4.2 MW each, and would have a total interconnection capacity of up to approximately 115 MW. The Project may construct greater than 115 MW nameplate capacity to compensate for electric losses along the 115-kV transmission line and in other Project facilities. Currently, Orion anticipates that the Project would utilize 3.03-MW turbines, which would result in the construction of approximately

43 turbines. If a turbine of a lower megawatt capacity is selected, then up to five additional turbines may be required to produce the approximate 115 MWs. Conversely, if a larger megawatt capacity turbine is selected, then fewer turbines would be constructed. The make and model of the turbine would be selected closer to construction based on availability and the market. Figures 1-1 and 1-2 show an indicative layout for 43 turbines. If additional turbines are required, the turbines would be located within the indicative layout and utilize the road network and other proposed infrastructure to the greatest extent practicable.

Turbine heights would be determined upon selection of final turbine make and model. Orion expects that the wind turbine "hub height" (height from the base of the tower to the center of the rotor hub on top of the tower) may be up to approximately 370 ft, and the total wind turbine height (i.e., height of vertical blade-tip pointing straight up) may be up to approximately 600 ft. These heights are based on the upper range of turbine dimensions being considered for the Project and may overestimate final dimensions.

Each turbine would sit on a concrete foundation to provide structural support to the assembled turbine. Each turbine foundation area would measure approximately 0.05 acres. Except for roughly 2.50 ft that would remain aboveground, the turbine foundation would be underground. There are two types of foundations typically used for turbines, mat or pier. The type of foundation is determined based on subsurface information obtained during geotechnical investigations. The depth of the mat foundation has a relatively shallow excavation (typically 6.0 to 10.0 ft. below final grade) while the pier foundation involves excavations as great as 40.0 ft. below final grade. The turbine tower would typically be painted a non-glare white per Federal Aviation Administration (FAA) requirements. The temporary construction footprint would be roughly 3.6 acres per turbine to stage the wind turbine parts and to maneuver equipment during turbine assembly. The long-term operational footprint would be approximately 0.05 acre per turbine (Table 2-1). If an additional five turbines are used, footprints would increase accordingly (Tables 2-1 and 2-2).

2.1.2.5.2 Access Roads

The preliminary estimate of access roads for the Project is approximately 39.0 miles (mi), including approximately 16.4 mi of improved existing roads and approximately 22.2 mi of newly constructed access roads that would be developed across leased private land to allow access to individual turbines. During construction and decommissioning, the disturbance area for new access roads would be approximately 50.0 ft. After construction, the long-term operational footprint for the access roads would be the length of the road maintained at a width of approximately 16.0 ft. (Table 2-1). Existing public and private roads would be used whenever practicable. Existing roads may require improvements before, during, or following construction. Improvements might include adding gravel, widening, or repairing potholes.

2.1.2.5.3 Operations and Maintenance Facility

The O&M facility would be a single story building that would house personnel, offices, operations and communication equipment, parts storage, maintenance activities, and a vehicle parking area.

An area for outdoor storage of larger equipment and materials would also be included within a fenced area for safety and security. Either the existing rural water system or private water would provide running water into the O&M facility well. Both the temporary and long-term footprint of the O&M facility would likely be an approximately 5-acre parcel (Tables 2-1) directly adjacent to the Project substation.

2.1.2.5.4 Meteorological Towers

The Project would include up to three permanent met towers to monitor weather and wind conditions within the Project vicinity. The design and other specifications of the proposed met towers have not been determined at this time, but would be established as the Project evolves. The met towers would comply with FAA guidelines, *Obstruction Marking and Lighting*. With Change 2. Advisory Circular AC 70/7460-1L. (e.g., FAA 2018), and would be connected to the Project communication system. The temporary construction and decommissioning footprint would be approximately 0.023 acre per met tower. The long-term operational footprint would be negligible (Table 2-1). Met towers are currently planned to be free-standing, however, if it is determined that guy-wires are needed, 4.5 acres per met tower would be the operational (long term) footprint. Table 2-2 presents the footprints with an additional 25% increase.

2.1.2.5.5 Temporary Laydown/Stockpile Areas/Batch Plant Areas and Crane Path

Temporary facilities for the Project would include a concrete batch plant, crane paths for the construction of the wind farm, and a laydown yard to store construction materials. Construction tools, materials, equipment, and vehicles would be stored at the laydown yard until needed for construction activities. The laydown yard would be revegetated once construction is complete, except for a portion retained for the O&M facility (if the laydown yard and O&M facility are sited at the same location).

2.1.2.5.6 34.5-kilovolt Collection System and Fiber Optic Communication System

Inter-facility communications would connect each wind turbine through buried fiber optic communication cables. Additionally, buried 34.5-kV collector lines would transfer wind-generated energy from each wind turbine to the Project substation. The length of these cables and lines would be approximately 40 mi each (Table 2-1). The electric collector lines and communication cables would be located in the same trench and buried approximately three to four ft below the ground surface. Construction of the trench would require a temporary 15-ft corridor for construction and decommissioning work (Table 2-1). The land area used for the trench would be available for agricultural use after construction and during Project operation.

2.1.2.5.7 Project Substation

The Project substation (Figures 1-1 and 1-2) would include transformer(s) to step up the voltage of the collector lines from 34.5-kV to 115-kV, above-ground infrastructure to connect the substation components, breakers, relays, switchgear, communications and controls, and other related facilities required for delivery of wind-generated electric power to WAPA's electric grid.

Design of the substation is not finalized, but Orion expects the substation to be enclosed by a chain link fence and require up to approximately six acres.

2.1.2.5.8 115-kilovolt Transmission Line and Switchyard

A 115-kV transmission line would be constructed to connect the Project substation to the 115-kV switchyard and interconnect with WAPA and the grid (Figure 1-1). Figure 1-1 shows two route options called the primary route and alternative route. The routes run primarily north along Banner CR-7 from the Project substation, heading northwest through Bull Canyon into Goshen County, Wyoming, then turning north towards Wyoming State Highway (Hwy) 151. The proposed switchyard is located along Hwy 151, three to four mi east of La Grange, Wyoming. The primary route is approximately 20 mi in length while the alternative route is approximately 21 mi. While the exact route for the transmission line has not been determined, the potential impacts of the two likely routes have been evaluated in Section 3.0, Affected Environment and Environmental Consequences.

The proposed 115-kV transmission line would include steel lattice, steel or wood monopole, and wood H frame towers at heights shorter than the wind turbines. The 115-kV transmission line would connect to the grid through the 115-kV switchyard that would be enclosed similar to the fenced Project substation.

Construction of the 115-kV transmission line would require a temporary work ROW approximately 150-ft wide, for the entire length of the line, to accommodate structure installation, conductor stringing, and line pulling. Environmental conditions (e.g., soils and vegetation) in all temporary workspaces would be restored once construction is complete. The 115-kV transmission line structure placement would result in a total of 0.10 to 0.12 acres of long-term surface disturbance along the transmission line ROW, depending on the route. The operational ROW (i.e., the line easement) would be 100-ft wide and maintained to provide long-term access for ground-based inspections, general maintenance, and repair. Vegetation within the ROW would be managed and maintained to support line operation. The switchyard would have a long-term footprint of approximately four acres (Table 2-1).

2.2 Environmental Conservation Measures and Best Management Practices

Specific to Project construction, operation, and maintenance activities, Orion has developed conservation measures and applicable BMPs to avoid and minimize potential environmental impacts or concerns. Additionally, Orion has engaged in discussions with various state and federal agencies (e.g., Nebraska Game and Parks Commission [NGPC], Wyoming Game and Fish Department [WGFD], WYDOT, U.S. Fish and Wildlife Service [USFWS], and Department of Defense), that resulted in the relocation of certain turbines to avoid or minimize potential concerns. Below is a general review of the environmental conservation measures and BMPs that Orion has implemented during the planning phase and would commit to during construction, operation and decommissioning of the Project.

2.2.1 General Planning and Land Use

- The Project was designed to utilize existing roads and utility corridors to the maximum extent practicable, and to minimize the number and length/size of new roads, laydown areas, and borrow pit areas.
- "Good housekeeping" procedures would be developed to ensure that during operation the site would be kept clean of debris, garbage, fugitive trash, or waste; to prohibit scrap heaps and dumps; and to minimize storage yards.
- An access road siting and management plan would be prepared incorporating applicable standards regarding road design, construction, and maintenance.
- Access roads would be designed to minimize total length, avoid wetlands, and avoid or minimize stream and drainage crossings.

2.2.2 Soil Resources

General steps Orion will take for avoiding or minimizing impacts to soil resources include the following:

- Design the Project to avoid steep slope areas as practicable and minimize construction cut and fill work.
- Obtain permits under the National Pollutant Discharge Elimination System Industrial Storm Water General Permit issued by the Nebraska Department of Environment and Energy, and the Large Construction General Permit issued by the Wyoming Department of Environmental Quality (WYDEQ). These permits require development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would be developed during civil engineering design of the Project and would include BMPs to control erosion and sedimentation.
- Minimize ground-disturbing activities, especially during the wet periods of the year.
- Surface new roads with aggregate materials, wherever appropriate.
- Restrict heavy vehicles and equipment to improved roads to the extent practicable.
- Control vehicle and equipment speed on unpaved surfaces.
- Stabilize disturbed areas that are not actively under construction using methods such as erosion matting or soil aggregation, as site conditions warrant.
- Regularly inspect access roads, utility and transmission line corridors, and tower site areas for damage from erosion, washouts, and rutting. Initiate corrective measures upon evidence of damage.
- Address drainage problems caused by construction to minimize damage to agricultural fields.

- Decompact soil to the extent practicable following completion of construction and during decommissioning.
- Salvage topsoil from all excavation and construction activities to the extent practicable, to reapply to disturbed areas once construction is completed.
- Dispose of excess excavation materials in approved areas to minimize erosion.
- Isolate excavated areas and soil piles from surface water bodies using silt fencing, bales, or other accepted methods to limit sediment transport by surface runoff.
- Use earthen dikes, swales, and lined ditches to divert local runoff around the construction site where practicable.
- Re-establish the original grade and drainage pattern to the extent practicable after construction is complete.

2.2.3 Water Resources

General steps Orion will take for avoiding or minimizing impacts to water resources include the following:

- A Spill Prevention, Control, and Countermeasures (SPCC) plan would be prepared for the Project to address accidental release of construction-related chemicals, fuels, or hydraulic fluid. Implementation of BMPs associated with the SPCC would minimize potential impacts on groundwater. BMPs for spill-related effects would include storing fuels within secondary containment devices, checking vehicles and equipment for leaks, performing refueling and equipment maintenance away from water wells and surface water resources, maintaining a spill response kit on-site, and appropriate reporting protocols for any spills.
- Apply standard erosion control BMPs to all construction activities and disturbed areas (e.g., sediment traps, water barriers, erosion control matting), as applicable, to minimize erosion and protect water quality.
- Apply erosion controls where it is probable soil erosion from vehicular traffic would occur.
- Construct drainage ditches only where necessary; use appropriate structures at culvert outlets to prevent erosion.
- Avoid or minimize alteration of existing drainage systems, especially in sensitive areas such as erodible soils or steep slopes.
- Clean and maintain catch basins, drainage ditches, and culverts as needed.
- Limit herbicide and pesticide use to non-persistent, immobile compounds and apply the chemicals using a properly licensed applicator in accordance with label requirements.
- Dispose of excess excavation materials in approved areas to minimize erosion and leaching of hazardous materials.

- Reestablish the original grade and drainage pattern to the extent practicable after construction is complete.

2.2.4 Air Quality

General steps Orion will take for avoiding or minimizing impacts to air quality include the following:

- Use access roads and parking lots surfaced with aggregates or that maintain compacted soil conditions to reduce dust generation where possible.
- Post and enforce speed limits on dirt and gravel access roads to minimize airborne fugitive dust.
- Minimize potential environmental impacts from the use of dust palliatives by taking measures to keep the chemicals out of sensitive terrestrial habitats and streams. The application of dust palliatives will comply with federal, state, and local laws and regulations.
- Heavy equipment will meet emission standards specified by State laws and regulations, and routine preventive maintenance will be conducted as required.
- Minimize idling of diesel equipment where practicable, unless necessary for proper operation.
- As practicable, stage construction activities efficiently to minimize the area of disturbed soils exposed at any particular time.
- Water unpaved roads, disturbed areas (e.g., scraped, excavated, backfilled, graded, and compacted), and loose materials generated during Project activities as practicable to minimize fugitive dust generation.
- Spray stockpiles of soils with water and/or treat the stockpiles with appropriate dust suppressants as reasonably necessary. Vegetative plantings may also be used to minimize dust generation for stockpiles that are expected to be inactive for relatively long periods.
- Train workers as necessary to comply with speed limits, use good engineering practices, minimize the drop height of excavated materials, and minimize disturbed areas where practicable.
- Cover vehicles transporting loose materials when traveling on public roads, and/or keep loads sufficiently wet and below the freeboard of the truck to minimize wind dispersal as practicable.
- Equipment would undergo routine inspection and preventative maintenance to minimize leaks.

2.2.5 Noise

General steps Orion will take for avoiding or minimizing noise include the following:

- A process will be established for documenting, investigating, evaluating, and resolving project construction-related noise complaints.
- All construction equipment will be maintained in good working order in accordance with manufacturer specifications and operate within applicable noise limits.
- Operate vehicles traveling within and around the Project in accordance with posted speed limits.
- When practicable, limit noisy construction activities to times of the day when nearby sensitive receptors are less likely to be disturbed.
- Locate stationary construction equipment (e.g., compressors or generators) as far as practicable from nearby sensitive receptors.
- In the event that blasting or pile driving would be needed during the construction period, notify nearby residents in advance.

2.2.6 Vegetation

General steps Orion will take for avoiding or minimizing impacts to vegetation include the following:

- Avoid siting infrastructure in wetlands and water bodies unless not practicable.
- Locate the 115-kV transmission line in areas where previous disturbance has occurred to the extent practicable, thereby minimizing impacts to trees, other vegetation, and associated wildlife.
- Minimize the area disturbed during the installation of met towers (i.e., the footprint needed for met towers and associated laydown areas) where possible.
- Minimize habitat disturbance by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.
- Restore and regrade disturbed soils to the extent practicable after construction. The construction contractor would coordinate with the landowner on native seed mixes, or other preferred species used for revegetation. The seed mixes and revegetation plan would be developed as part of the SWPPP for the Project.
- Develop a plan for control of noxious weeds and invasive plants that could occur as a result of new surface disturbance activities at the site. The plan would address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations.

2.2.7 Wildlife

General steps Orion will take for avoiding or minimizing impacts to wildlife include the following:

- Orion has elected not to apply for an Eagle Take Permit under the Bald and Golden Eagle Protection Act (BGEPA) at this time because this is a voluntary permit. Orion may consider this permit at a later date. When Orion has developed a final layout for the Project and before the Project is interconnected with WAPA, Orion will prepare an Eagle Management Plan to minimize potential collision risks for eagles. Should they later seek an Eagle Take Permit, this document would be updated to become an Eagle Conservation Plan that includes any required compensatory mitigation.
- When Orion has developed a final layout for the Project and before the Project is interconnected with WAPA, Orion will prepare and implement a Bird and Bat Conservation Strategy (BBCS) in accordance with the USFWS Wind Energy Guidelines to minimize impacts to avian and bat species during construction and operation of the Project.
- To the extent practicable, design and construct the 115-kV transmission line to minimize avian electrocution risk (as applicable to this voltage and structure design) and collision risks (as applicable to line location), based on guidelines outlined in the Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2006, 2012).
- To the extent practicable, conduct biological surveys for species listed by the Endangered Species Act of 1973 (ESA), Migratory Bird Treaty Act (MBTA), or BGEPA prior to construction for any new area not previously surveyed, if necessary, to ensure compliance with these acts.
- Conduct pre-construction surveys in and around the wind turbine sites for mountain plover, thick-billed longspur (Longspur), ferruginous hawk, and burrowing owl nests, and swift fox dens, to ensure that denning and nesting species are not present within seven days prior to construction activities being initiated.
- Instruct employees, contractors, and site visitors to avoid harassment and to minimize disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. Employee, contractor, and site visitor's pets would not be allowed on the Project.
- Establish temporary wind turbine buffer zones around active raptor nests during construction using the *U.S. Fish and Wildlife, Region 6 Wildlife Buffer Recommendations for Wind Energy Projects version 3* (USFWS 2021b).
- Conduct post-construction avian and bat fatality monitoring at wind turbines in accordance with the WEG.

- Any incident (defined as injury or mortality) involving a state- or federally listed threatened or endangered species, golden or bald eagle, or species protected by the MBTA, would be reported to the USFWS and the NGPC or WGFD (as appropriate) within 24 hours of confirmed identification by a qualified biologist. This includes impacts to active nests defined by the presence of eggs or chicks in the nest.
- If needed during construction, only use explosives within specified times and at specified distances from sensitive wildlife or surface waters, as established by the appropriate federal and state agencies.
- During Project operations, use designs for permanent met towers that do not require guy wires to the extent practicable.
- Promptly dispose of all garbage and human waste generated onsite in order to avoid attracting nuisance wildlife.
- Train O&M staff to recognize mortalities that may be sensitive species as well as to observe injured individuals to determine if they are sensitive species.

2.2.8 Visual Resources

General steps Orion Project will take for avoiding or minimizing impacts to visual resources include the following:

- For ancillary buildings and other structures, low-profile structures will be chosen whenever practicable to reduce their visibility.
- To the extent permitted by the FAA and by state and local permitting authorities, color selections for turbines will be made to reduce visual impact and will be applied uniformly to tower, nacelle, and rotor, unless gradient or other patterned color schemes are used. Recent studies suggest interspersed colored turbine blades may reduce the potential for avian collision. If supported by additional research, interspersed colored turbine blades may be considered where the permitting authority allows.
- To the extent allowed by the FAA and by state and local permitting authorities, grouped structures will all be painted the same color to reduce visual complexity and color contrast where practicable.
- Where possible for ancillary structures, materials and surface treatments may repeat and/or blend with the existing form, line, color, and texture of the landscape.
- Use non-reflective paints and coatings on wind turbines, visible ancillary structures, and other equipment to reduce reflection and glare wherever possible.

- Lighting for facilities will not exceed the minimum required for safety and security as established by the FAA, the Department of Defense, and state and local permitting authorities. If possible, where they are necessary, security lights shall be extinguished except when activated by motion detectors (e.g., only around the substation) or down-shielded to prevent lighting into the night sky.
- A site restoration plan will be in place prior to construction, and restoration of the construction areas will occur at the end of construction

2.2.9 Construction

General steps Orion will take for minimizing construction impacts include the following:

- Disturbed surfaces will be restored to the greatest extent practicable to their original contours and revegetated after construction. Orion will take reasonable action to limit erosion.
- Existing rocks, vegetation, and drainage patterns shall be preserved to the extent practicable.
- Care will be taken to minimize color and texture contrasts from new roads and the surrounding landscape where possible.
- The geometry of road ditch design will consider visual objectives where feasible.
- Areas for planting pockets will be included in designs where feasible.
- To the extent practical, topsoil from cut/fill activities will be spread on freshly disturbed areas to minimize impacts and aid revegetation. Best efforts will be used to not locate topsoil piles in sensitive viewing areas.
- Reasonable efforts will be used to minimize the impacts of excess cut/fill material and to be disposed of or relocate appropriately.
- Where feasible, construction on wet soils will be avoided or limited in order to reduce erosion.
- Communication cables and low or medium voltage utility power lines will be buried, where practicable.
- Culvert ends will be designed to minimize color contrasts with existing landscape as necessary.
- Signage will only be used where necessary and designed to minimize impact.
- The burning of trash will be prohibited during construction; trash will be stored in containers, hauled offsite or otherwise disposed of appropriately.
- Litter must be controlled and removed during construction.

2.2.10 Operations and Maintenance

General steps Orion will take for minimizing impacts from O&M processes include the following:

- Repair inoperable turbines as quickly as reasonably practicable with consideration to the Eagle Management Plan and the BBCS. Also repair and replace nacelle covers and rotor nose cones as quickly as reasonably practicable.
- Clean as reasonably practicable, nacelles and towers.
- Clean facilities and offsite surrounding areas of debris and wind farm related trash or waste on a regular basis.

2.2.11 Decommissioning

General steps Orion will take for minimizing impacts during decommissioning include the following:

- Remove as specified in landowner agreements, all aboveground and near-ground structures.
- Return as closely as practical, soil borrow areas, cut-and-fill slopes, berms, waterbars, and other disturbed areas to previous condition, or surrounding conditions.
- Use native species for revegetation, unless otherwise requested by the landowner. Take care to minimize the impacts to existing local vegetation and revegetation. Coordinated with local authorities, such as country extension services, landowners, weed boards, or land management agencies about seed mixes to be used.
- Remove or bury gravel and other surface treatments unless alternative treatment is agreed with the landowner.

2.2.12 Paleontological, Cultural, and Historic Resources

General steps Orion would take for avoiding or minimizing impacts to paleontological, cultural, and historic resources include the following:

- To the extent land access is practicable, conduct cultural surveys prior to construction for any infrastructure deviating from the proposed indicative layout.
- Cultural resources discovered during construction shall immediately be brought to the attention of WAPA and the State Historic Preservation Offices (SHPOs) in accordance with the concurrence letters from each SHPO. Work will be halted for a reasonable time in the vicinity of the find to avoid further disturbance of the resources while the find is being evaluated and appropriate mitigation plans are being developed.

- Prior to construction, Orion will determine whether paleontological resources exist in the area on the basis of the sedimentary context of the area; a records search of federal, state, and local inventories for past paleontological finds in the area; review of past paleontological surveys; and/or a paleontological survey. A paleontological resources management plan may be developed depending on the potential for paleontological material to be present.

2.2.13 Transportation

General steps Orion will take for minimizing transportation impacts include the following:

- A transportation plan for Project construction will be developed in coordination with local CRs departments. In addition, the process to be used will comply with unique state requirements and U.S. Department of Transportation requirements, and all necessary permits will be clearly identified and obtained.
- A traffic management plan for Project construction shall be prepared in coordination with local CRs departments. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any temporary changes in lane configuration as necessary and other items identified in agency discussions.

2.3 No-action Alternative

Under the No-action Alternative, WAPA would not enter into an interconnection agreement with Orion and would not allow the Project to interconnect to the WAPA transmission system. Although Orion could still build the Project and pursue an interconnection with a private utility, for comparison, this alternative assumes that the proposed Project would not be built.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section briefly describes the existing physical, social, and regulatory environment potentially affected by the Proposed Action (the Project) or the No-action Alternative and describes the potential consequences from these actions. Impacts to resources from the Project were evaluated within a defined analysis area for the wind turbine facility and the 115-kV transmission line routes (Figure 3-1), except where indicated otherwise. The analysis areas were based on the indicative layout and the Project footprints of the infrastructure facilities and components (Table 2-1). The turbine analysis area was delineated using a minimum convex polygon that encompassed the 43 turbines and met towers with a quarter-mi buffer. This area would include the access roads, substation, collector lines and communication cables. The transmission line analysis area was delineated based on landowner agreements and to allow flexibility to develop the most efficient route possible. Where footprints overlapped (i.e., a turbine footprint overlapping with an access road), the overlap was removed, thus the amount of potential impacts reported in the analysis is less than the footprints identified in Table 2-1. The Project may include up to an additional five turbines and up to a 25% increase in infrastructure, which would be located within the turbine analysis area and transmission line analysis area. The analysis areas (Figure 3-1) were established to evaluate a larger area within which Orion may adjust the final infrastructure layout or transmission line route as needed.

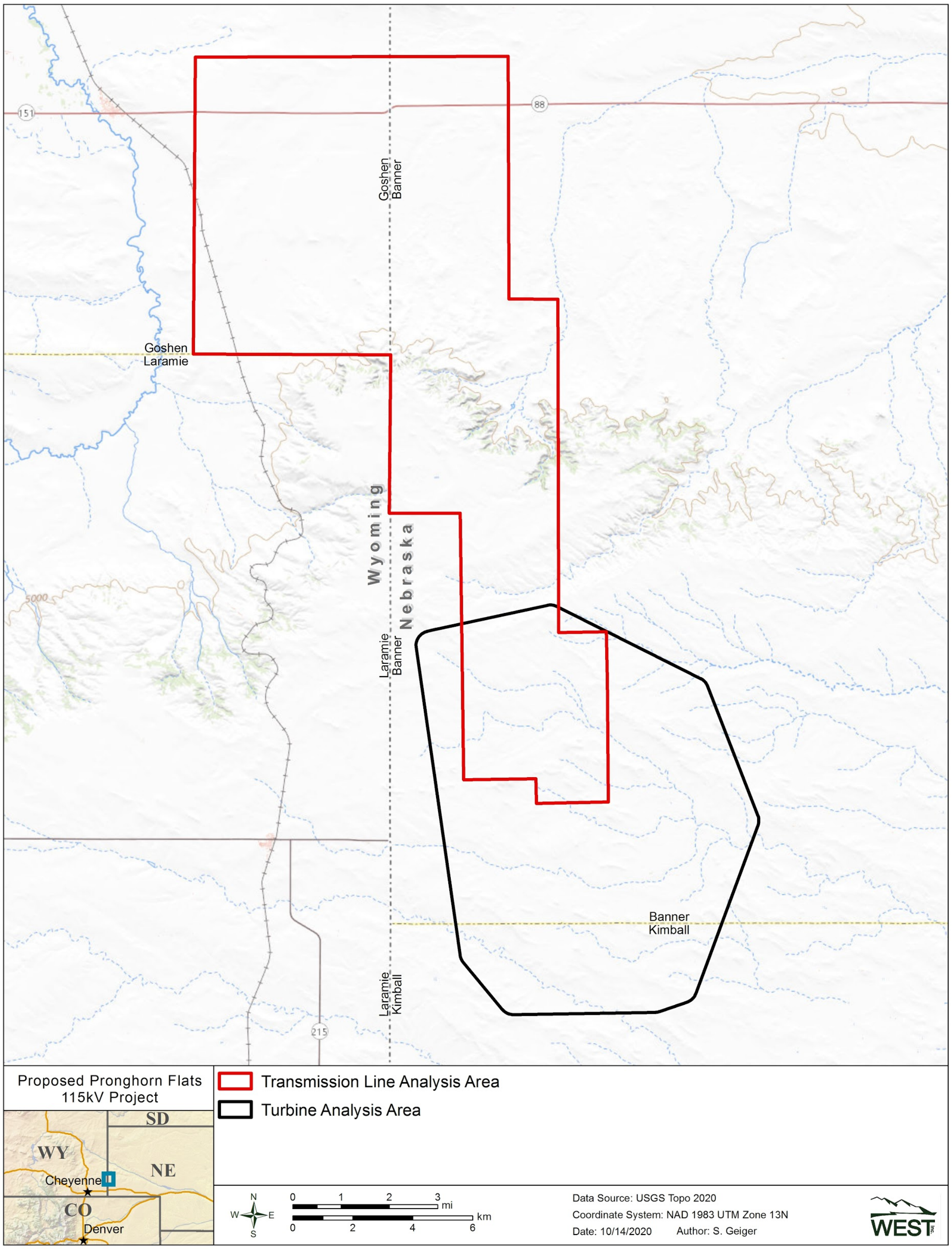

Figure 3-1. Turbine and 115-kilovolt transmission line analysis areas.

The analyses disclose the type and magnitude of potential impacts associated with the development of the indicative Project. If the final design results in any ground disturbing activities occurring outside of the indicative layout footprint, Orion has committed to conducting additional surveys for wetlands, biological resources, and cultural resources prior to construction to avoid impacting these resources.

3.1 Soil Resources

The majority of the analysis areas are located within the High Plains Section of the Great Plains Province of the Interior Plains. The Great Plains province is characterized by plateau-like flat plains with relatively little relief throughout the area. The soils within the analysis areas primarily consist of Entisols and Mollisols, which are moderately susceptible to erosion and generally good for crop production. Most soils in the analysis areas are well-drained (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 2006).

Fragile soils are areas rated as highly or severely erodible by wind or water, as described by the NRCS Soil Survey Report (USDA NRCS 2019). Water erosion is the detachment and movement of soil by water. Natural erosion rates depend on inherent soil properties, slope, soil cover, and climate. The water erosion hazards from unsurfaced roads and barren areas are based on soil factors such as slope, rock fragment content, and the K factor[1] (soil erosion factor). Water-erodible soils are rated as having a severe, moderate, or slight potential for water erodibility, all of which occur within the turbine and transmission line analysis areas (Figures 3-2 and 3-3). Approximately 4.5% of soils in the turbine analysis area have severe water erosion potential and almost half (47.5%) have moderate water erosion potential (Table 3-1). In the 115-kV transmission line analysis area, 11.5% of the soils have severe water erosion potential and 28.0% have moderate water erosion potential (Table 3-1).

Table 3-1. Water erosion potential risk class in the turbine analysis area and the transmission line analysis area.

Erosion Risk Class[1]	Turbine Analysis Area (Acres)	Transmission line Analysis Area (Acres)
Severe	1,326	4,983
Moderate	13,982	12,176
Slight	14,110	25,235
Not Evaluated	N/A	868
Total*	**29,418**	**43,260**

* Discrepancies due to rounding.

[1] Water erosion potential factors ratings <0.25 = Low, 0.25 to 0.40 = Moderate, 0.40+ = High.

[1] A soil erodibility factor (K-factor) used in the universal soil loss equation is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. Estimation of the factor takes various soil parameters into account, including soil texture, percent of sand greater than 0.10 millimeters in diameter, soil organic matter content, soil structure, soil permeability, clay mineralogy, and coarse fragments. K-factor values range from 0.02 to 0.64. Greater values indicate a higher susceptibility to erosion.

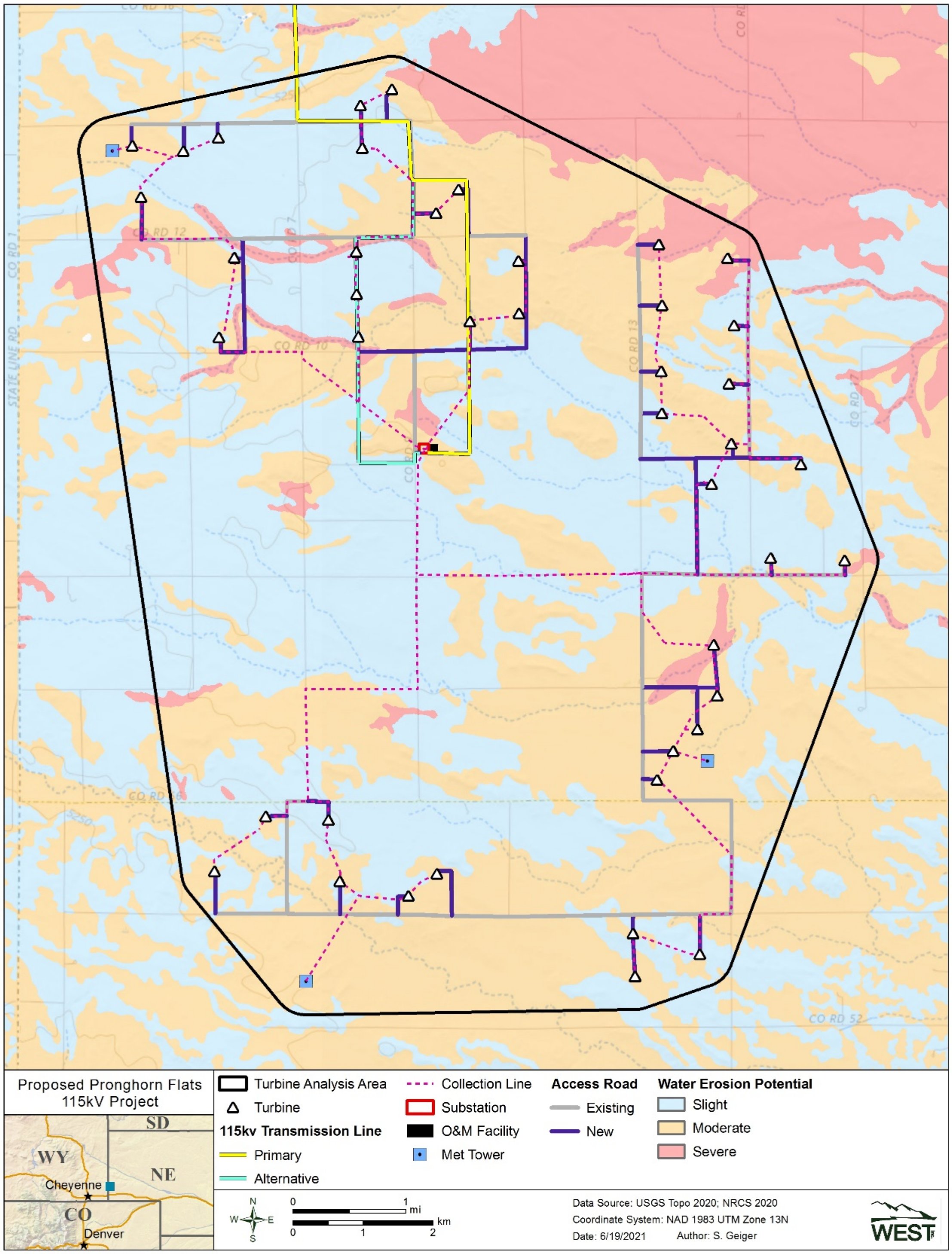

Figure 3-4. Water erosion potential soil ratings within the turbine analysis area.

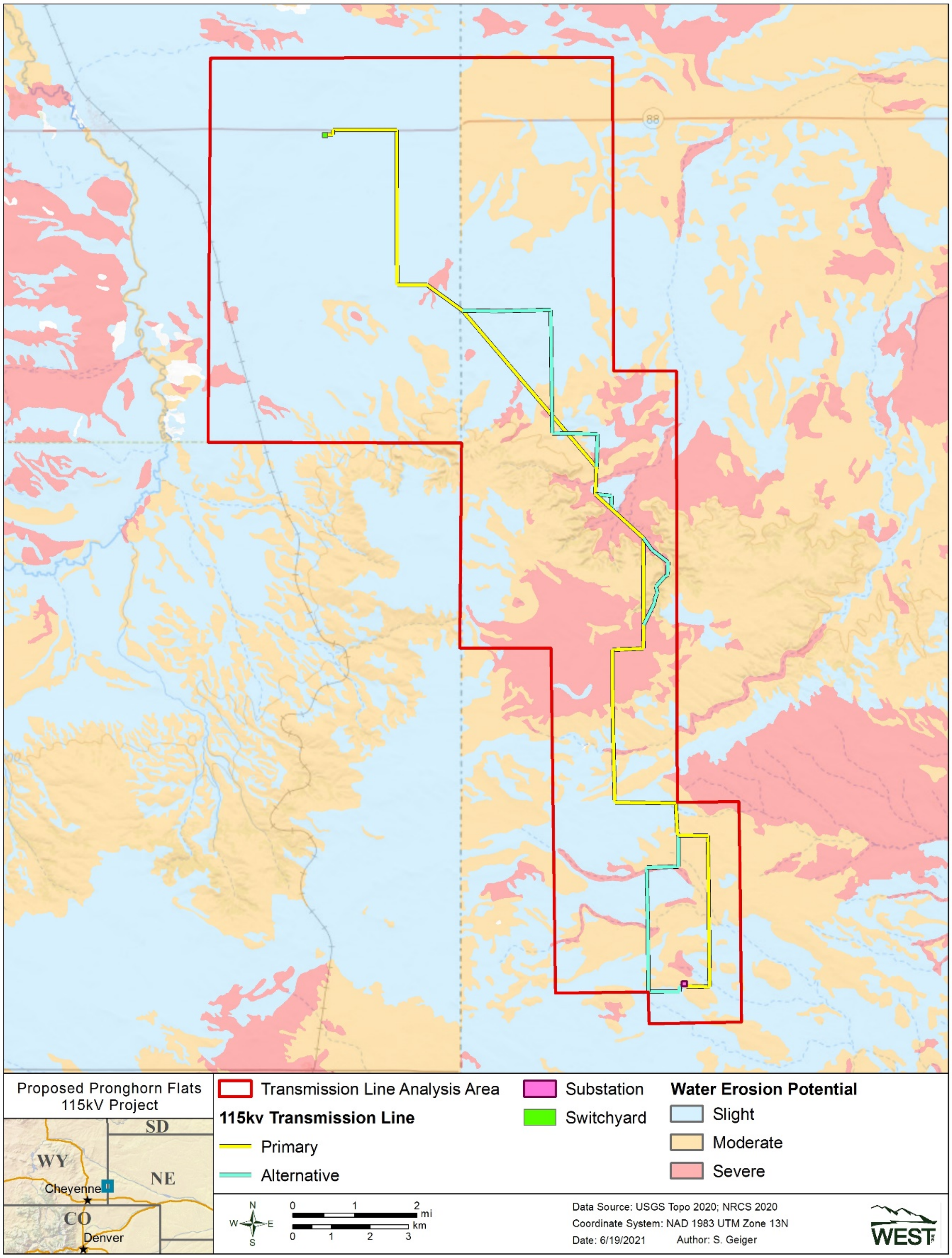

Figure 3-5. Water erosion potential soil rating within the transmission line analysis area.

Wind erosion is physical wearing of the earth's surface by wind, removing and redistributing soil. Small blowout areas may be associated with adjacent areas of deposition at the bases of plants or behind obstacles, such as rocks, shrubs, fencerows, and road banks. Wind erosion is a critical issue that results in the displacement or loss of topsoil in some areas, increased sediment deposition in other areas, and impacts to ambient air quality from elevated fugitive dust levels. The loss of topsoil can impact vegetation by reducing the A (topsoil) and B (subsoil) soil horizons, limiting productivity and soil moisture. Wind-erodible soils are rated as having a severe, moderate, or slight potential for wind erodibility, all of which occur within the analysis area (Figures 3-4 and 35). Over half (57.7%) of the soils in the turbine analysis area have severe wind erosion potential and 41.2% have moderate water erosion potential (Table 3-2). In the 115-kV transmission line analysis area a majority (80.1%) of the soils have severe wind erosion potential and 17.0% have moderate wind erosion potential (Table 3-2).

Table 3-2. Wind erosion potential risk class in the turbine analysis area and transmission line analysis area.

Erosion Risk Class[1]	Turbine Analysis Area (Acres)	Transmission Line Analysis Area (Acres)
Severe	16,983	34,656
Moderate	12,121	7,356
Slight	314	382
Not Evaluated	N/A	868
Total*	29,418	43,260

* Discrepancies due to rounding.

[1] Wind erodibility group ratings: 1–3 severe, 4–5 moderate, and 6–8 slight.

Soil compaction is another process affecting soils in the analysis areas, and compaction occurs when soil particles are pressed together, the pore spaces between the particles are reduced, and bulk density is increased. This results in decreased infiltration rates and increased runoff and erosion.

Important farmlands designated as either prime, unique, and/or land of statewide or local importance, are subject to protection under the Farmland Protection Policy Act of 1981 (7 U.S. Code [USC] 4201, *et seq*.], implementing regulations 7 CFR Part 658. Within the analysis areas there are the following farmland destinations: "farmland of statewide significance, if irrigated," "prime farmland if irrigated," and "not prime farmland." There are neither "farmlands of statewide importance" nor "prime farmlands" within the analysis areas (USDA NRCS 2019).

The risk of seismic activity in the vicinity of the analysis areas is relatively low. Available geologic mapping and information from the U.S. Geological Survey (USGS) Earthquake Hazards Program do not indicate any active or inactive faults within the analysis areas (USGS 2020a). No reclaimed or active mining operations, which could lead to subsidence or collapse, exist within the analysis areas. There are no active oil and gas operations within the analysis areas, however there are oil and gas activities in the Project vicinity.

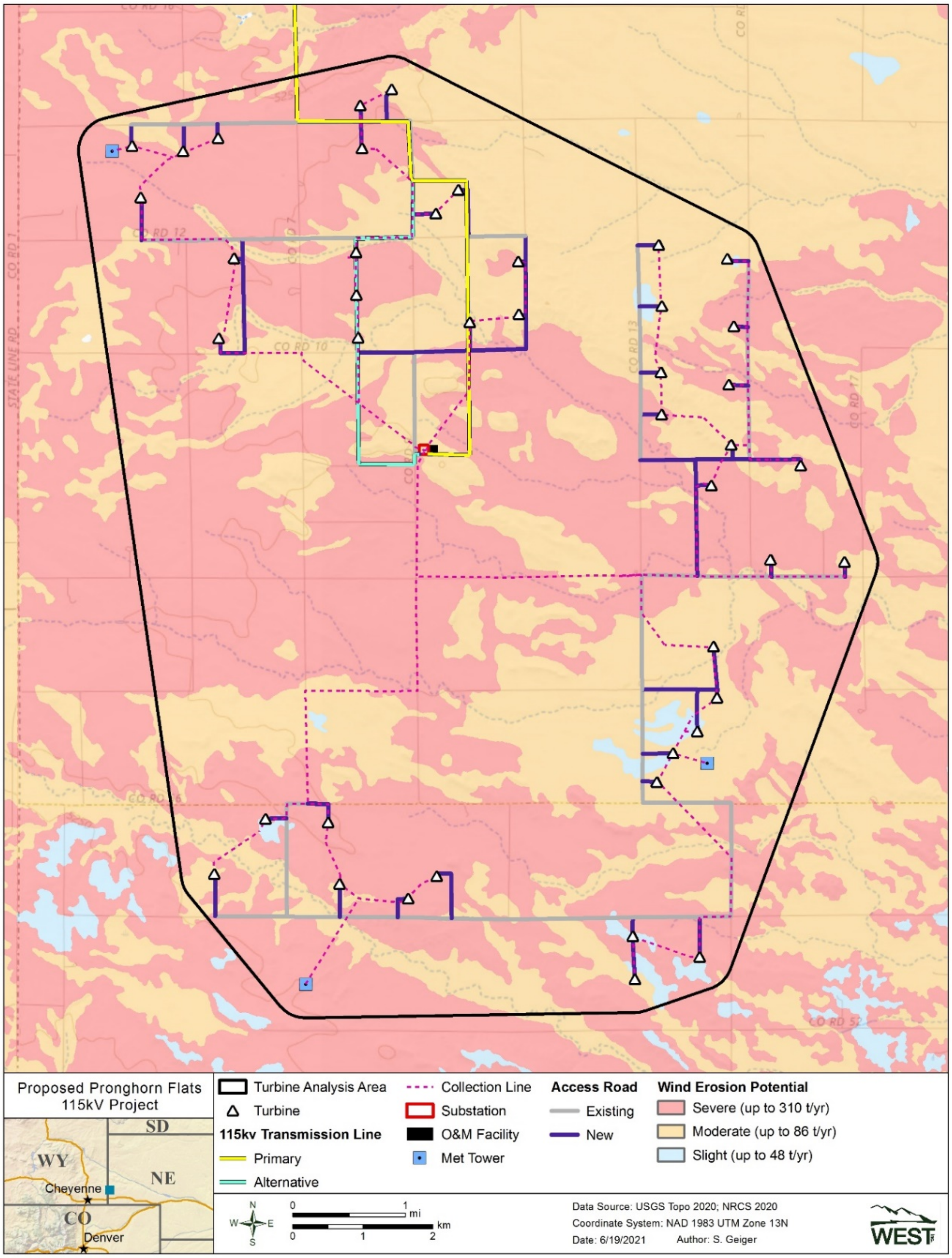

Figure 3-6. Wind erosion potential soil ratings in the turbine analysis area.

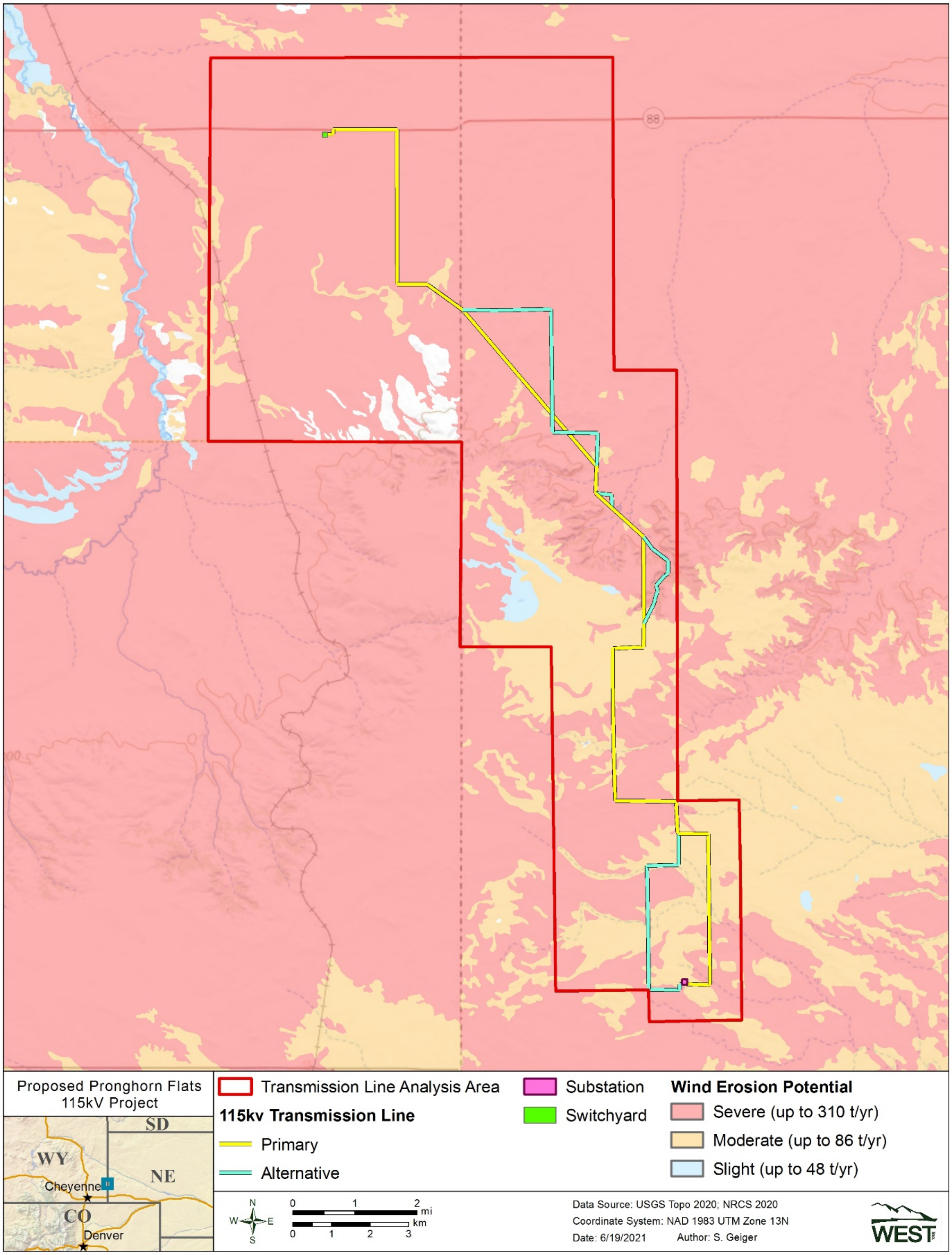

Figure 3-7. Wind erosion potential soil ratings in the 115-kilovolt transmission line analysis area.

3.1.1 Environmental Consequences—Proposed Action

Construction of the Project under the indicative layout of 43 turbines and including either transmission line route would temporarily impact approximately 789 to 827 acres of soils susceptible to wind or water erosion from road construction, foundation excavation, trenching for the collector lines and communication cables, laydown areas, and other construction activities (Tables 3-3 and 3-4). This range would increase with an additional five turbines, if built. Cranes and bucket trucks used for construction of wind turbines and transmission structures would travel along identified and prepared paths. Existing vegetation would be removed in the associated areas and staging pads potentially increasing the risk of wind and water erosion. The use of vehicles and heavy equipment would compact soils and could limit vegetative cover. Topsoil would be removed and segregated prior to construction to prevent mixing with subsoil, where practicable. Following construction, subsoil would be decompacted, where needed; salvaged topsoil would be replaced and soil would be stabilized either with new surfaces or vegetation where feasible. The long-term impacts from turbine infrastructure on moderate or severe soil erosion risks classes for wind and water would be approximately 82 and 55 acres, respectively (Table 3-3). The long-term impact from the turbines and infrastructure would be a loss of approximately 85 acres of soil resources, including up to around 62 acres of prime farmland, if irrigated, and less than an acre for the transmission line poles. The temporary and long-term impacts to soils would increase with each additional component.

Table 3-2. Approximate acreage potentially impacted by water and wind erosion due to turbine infrastructure in the Pronghorn Flats 115-kilovolt Project.

Erosion Risk Class	Wind Erosion Temporary(Acres)[1]	Wind Erosion Long Term (Acres)[1]	Water Erosion Temporary (Acres)[2]	Water Erosion Long Term (Acres)[2]
Severe	231	40	34	6
Moderate	187	42	243	49
Slight	22	3	163	31
Total*	**440**	**85**	**440**	**86**

[1] Wind erodibility group ratings: 1–3 severe, 4–5 moderate, and 6–8 slight.

[2] Water erosion potential factors ratings <0.25 = Low, 0.25–0.40 = Moderate, 0.40+ = High.

* Discrepancies due to rounding.

Source: U.S. Department of Agriculture Natural Resources Conservation Service 2019.

Table 3-3. Approximate acreage potentially impacted temporarily by water and wind erosion due to the primary and alternative transmission line routes in the Pronghorn Flats 115-kilovolt Project.

Erosion Risk Class	Wind Erosion Primary (Acres)[1]	Wind Erosion Alternative (Acres)[1]	Water Erosion Primary (Acres)[2]	Water Erosion Alternative (Acres)[2]
Severe	250	295	64	83
Moderate	99	93	102	80

Table 3-3. Approximate acreage potentially impacted temporarily by water and wind erosion due to the primary and alternative transmission line routes in the Pronghorn Flats 115-kilovolt Project.

Erosion Risk Class	Wind Erosion Primary (Acres)[1]	Wind Erosion Alternative (Acres)[1]	Water Erosion Primary (Acres)[2]	Water Erosion Alternative (Acres)[2]
Slight	0	0	183	225
Total*	**349**	**387**	**349**	**387**

[1] Wind erodibility group ratings: 1–3 severe, 4–5 moderate, and 6–8 slight.

[2] Water erosion potential factors ratings <0.25 = Low, 0.25–0.40 = Moderate, 0.40+ = High.

* Discrepancies due to rounding.

Source: U.S. Department of Agriculture Natural Resources Conservation Service 2019.

Areas with fragile soils where vegetation has been removed or where slopes are steep (greater than 10%) are vulnerable to disturbance and the displacement of soil particles by wind, water, or other natural and anthropogenic forces. Construction activities conducted during times of year with comparatively high soil moisture content (i.e., spring or after a recent precipitation event) could lead to rutting, compaction, accelerated runoff, erosion, and sedimentation to intermittent streams. Table 3-5 presents transmission line routes on slopes greater than 10%. There are no other planned Project components that intersect slopes greater than 10%.

Table 3-4. Potential impacts to land with slopes that have an incline greater than 10% along the proposed transmission line routes in the Pronghorn Flats 115-kilovolt Project.

Component	Temporary Impact (Acres)	Long-term Impact (Acres)
Primary	5	–
Alternative	2	–

Source: U.S. Department of Agriculture Natural Resource Conservation Service 2019.

3.1.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on geological or soil resources from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue and result in the same type and level of impacts to these resources as currently exist in 2022.

3.2 Water Resources

The analysis areas cross two Hydrological Unit Code 8 watersheds. Project components, including wind turbines, transmission lines, collection and communication system, substation, operations buildings, and switchyard, are within the Lower Lodgepole, Pumpkin, and Horse watershed surface water drainage systems (Table 3-6). The depth to water table for the analysis areas is more than 6.5 ft (USDA NRCS 2019).

Table 3-5. Hydrological Unit Code 8 watersheds in the Pronghorn Flats 115-kilovolt Project analysis areas.

Watershed	Turbine Analysis Area (Acres)	Transmission Line Analysis Area (Acres)
Lower Lodgepole	25,590	5,922
Pumpkin	3,828	35,778
Horse	0	1,582
Total*	**29,418**	**43,282**

* Discrepancies due to rounding.

Source: U.S. Geological Survey 2019.

According to the Federal Emergency Management Agency (FEMA) Flood Map Service Center, FEMA has not completed a study to determine flood hazard in Banner or Kimball counties, Nebraska, or Goshen County, Wyoming, and flood maps have not been published at this time (FEMA 2020). Based on NRCS soils data, flooding in the analysis areas is not probable (flooding occurs less than once every 500 years) or rare (chance of flooding is 1% to 5% in any year) (USDA NRCS 2019).

Wetlands and streams were identified using desktop evaluations and follow up field surveys (Welsch 2020). For methodology relating to the desktop evaluation and field surveys, see the report in Appendix A. Three wetlands were delineated in the survey area and six sample points were collected (Figure 3-5, Table 3-7). All wetlands were palustrine emergent (PEM) within linear drainages. Two wetlands (w-mw-002e and w-mw-003e) occur at different locations along the same drainage. This area appears to receive ephemeral flow from the nearby bluffs. Another wetland (w-mw-001e) receives water from an overflowing stock tank fed by a groundwater pump. These three wetland features were delineated and are located within the primary and alternative transmission line routes.

Table 3-6. Wetlands and estimated acreages delineated in the Pronghorn Flats 115-kilovolt Project transmission line routes.

Wetland Identification	Wetland Classification	Acres
w-mw-001e	PEM	0.11
w-mw-002e	PEM	0.15
w-mw-003e	PEM	0.08
Total		**0.34**

PEM = palustrine emergent.

Figure 3-8. Delineated wetlands within the transmission line primary and alternative route associated with the Pronghorn Flats 115-kilovolt Project.

Six linear water features were identified during the field investigation. Four of these features were in the main section of Bull Canyon and determined to be intermittent streams, while two were in a side branch of Bull Canyon and are part of an ephemeral stream (Table 3-8, Figure 3-6). The features were three to six feet in width. Two intermittent stream features in the survey area were each bisected by a culvert under a road (s-mw-001 and s-mw-003; Figure 3-6). All stream features were along the alternative route of the proposed transmission line except s-mw-005, which is found within the primary transmission line route (Figure 3-6). One ephemeral open water was delineated within the proposed wind infrastructure temporary impact area (o-mw-001; Figure 3-7, Table 3-8).

Table 3-7. Waterbodies and acreages delineated in the Pronghorn Flats 115-kilovolt Project survey area.

Waterbody Identification	Waterbody Classification	Acres
s-mw-001	Intermittent	0.04*
s-mw-002	Intermittent	0.03
s-mw-003	Intermittent	0.07*
s-mw-004	Intermittent	0.04
s-mw-005	Ephemeral**	0.02
s-mw-006	Ephemeral**	0.01
o-mw-001	Ephemeral**	0.04
Total Intermittent Features		**0.14**
Total All Features		**0.25**

* Excluding culvert section.

** Ephemeral features are not considered Waters of the U.S. (U.S. Army Corps of Engineers and U.S. Environmental Protection Agency 2020), but are presented here for reference.

3.2.1 Environmental Consequences—Proposed Action

The types of potential impacts on surface water resources relate to changes in water quality from erosion, sedimentation, and spills. Federal regulations that ensure the protection of water resources include the Safe Drinking Water Act of 1974 (SDWA) and the Clean Water Act of 1972 (CWA). The SDWA protects drinking water sources and requires strategies to prevent pollution of these sources. The CWA regulates pollutant discharge into streams, rivers, and wetlands. The U.S. Environmental Protection Agency (USEPA) has established primary and secondary standards to guarantee drinking water quality. The Nebraska Department of Environmental Quality (NEDEQ) maintains Nebraska Administrative Code Title 117, integrating federal standards and provides more specific information for waters within the State of Nebraska (NEDEQ 2019a). The Project would not substantially impact municipal or private water uses in the analysis areas.

Groundwater dewatering is not anticipated to be a major concern because wind turbines are typically placed at locations where the water table tends to be deeper. Should dewatering become necessary, Orion would obtain the necessary permits and properly handle groundwater to allow sediments to settle out and be removed before the water is discharged in order to minimize sedimentation of surface waters.

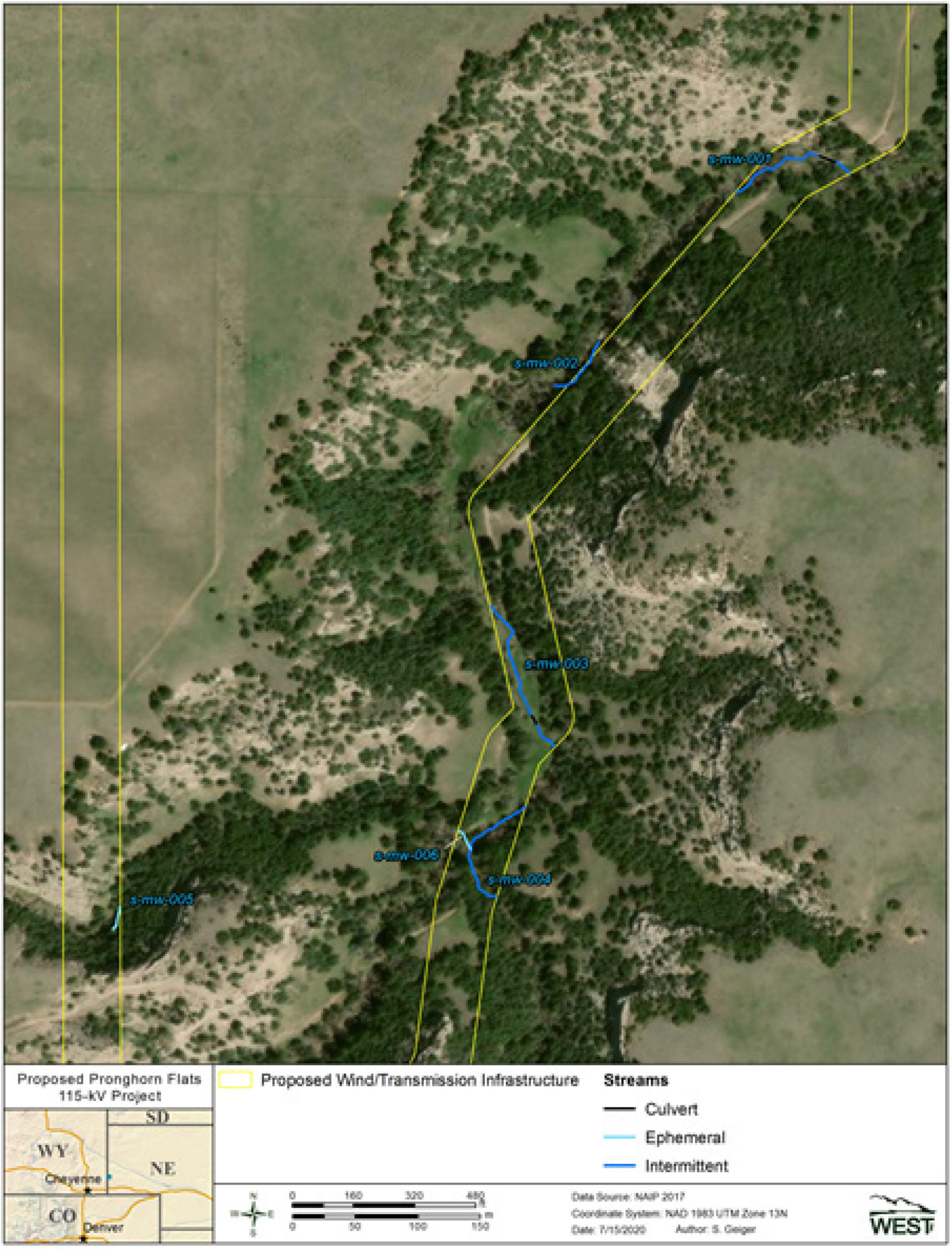

Figure 3-9. Linear waterbody features located within the transmission line primary and alternative routes associated with the Pronghorn Flats 115-kilovolt Project

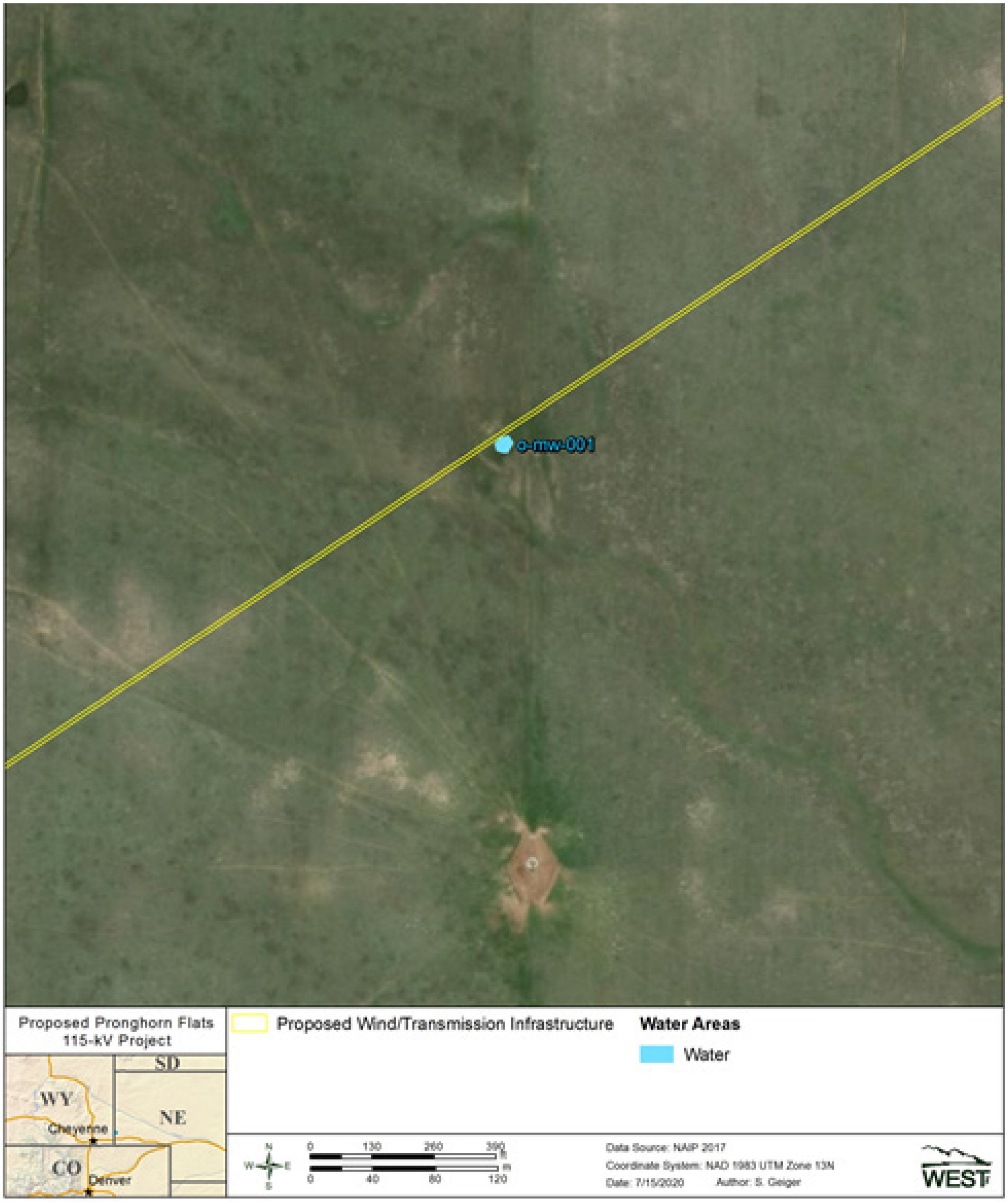

Figure 3-10. Ephemeral open waterbody delineated within the temporary footprint areas associated with the Pronghorn Flats 115-kilovolt Project.

Executive Order 11988 (1977), Floodplain Management, requires an evaluation of impacts to floodplains for all Federal actions and directs Federal entities to reduce impacts to floodplains and minimize flood risks to human safety. Further, the DOE is required under 10 CFR § 1022.11 (2021) to determine if a proposed action would be located in a floodplain. A FEMA flood hazard map is not available, however, considering the NRCS soils data, the Project is located in an area where flooding is not probable or rare, thus, the Project would have no impact on existing floodplains.

Based on the indicative layout, three PEM wetlands totaling approximately 0.34 acres were delineated in the transmission line survey area. Additionally, six linear water features were also delineated in Bull Canyon within the area surveyed for the transmission line. The wetlands were collocated along the same drainage as the linear water features. One ephemeral depression was recorded outside of the survey area but within a few feet of the surveyed corridor. Even though the depression is technically outside the survey corridor, it was included in results because the survey area used in this study is a representation of the project layout that could change in the future. No collected features have a clear connection to traditional navigable waters and, therefore, are likely not jurisdictional and would not be regulated by the U.S. Army Corps of Engineers (USACE) according to the final rule on the definition of ‘‘Waters of the United States,’’ finalized June 22, 2020 (USACE and USEPA 2020). All the features have intrinsic ecological value even if there is no regulatory coverage, especially wetland features, given their relatively high ecological quality. If changes to permitting regulations occur, these features should be re-evaluated to see if their likely jurisdictional status changes and if additional discussion with the USACE is needed. The construction of the transmission line could avoid potential impacts to wetlands and other linear water features by selecting the primary transmission line route as all the wetlands and linear water features identified were located on the alternative route, with the exception of one linear feature. If the alternate transmission line route is selected, wetlands would be avoided by careful pole placement.

The types of potential impacts to wetlands include changes to wetlands and natural flow systems. Wetland resources in the analysis areas consist of freshwater emergent, freshwater pond, and riverine wetlands. The NGPC has committed to work collaboratively across agencies to promote wetland protections and conservation with the *Wetland Program Plan for Nebraska 2019-2023* (NGPC 2019).

Once construction is completed, the original grade and drainage pattern of the analysis areas would be reestablished to the extent practicable. Disturbed areas would be revegetated to minimize erosion to surface water resources during Project operation. Herbicides, if used to control noxious weeds and vegetation growth around towers and access roads, could also degrade water quality in nearby surface water bodies and shallow aquifers.

Decommissioning would involve ground-disturbing activities that could increase the potential for soil compaction, soil erosion, surface runoff, and sedimentation of surface waterbodies. Standard erosion controls would be implemented to minimize sedimentation to offsite water bodies.

Culverts to allow for protection and continued water flow. The potential also exists for impacts to surface water quality from spills of contaminants and fluids (such as petroleum products) that may leave the Project during runoff to drainage systems or leaching into groundwater. The potential impacts would be reduced by the proposed measures identified in Section 2.2.3.

3.2.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on water resources from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue.

3.3 Air Quality

The USEPA has set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, particulate matter (PM), and lead. Volatile organic compounds (VOCs) can participate in photochemical reactions that form ozone, so VOC levels are also monitored (USEPA 2016). Primary and secondary NAAQS levels are set to protect public health and the environment with an adequate margin of safety (NEDEQ 2008).

The NEDEQ maintains Title 129, which adopts applicable primary and secondary ambient air quality standards in the State (NEDEQ 2019b). The WYDEQ-Air Quality Division set a goal to protect, conserve, and enhance the quality of Wyoming's air resource by maintaining NAAQS standards and practices (WYDEQ 2015).

The USEPA also tracks emissions of greenhouse gasses (GHGs). GHGs are emitted through natural processes and human activities, including the production, transport, and burning of fossil fuels; emissions from livestock and agricultural practices; burning of solid wastes and trees; and emissions from various industrial activities. Over the past 150 years, human activities have been responsible for most of the increases in GHGs (USEPA 2018).

An area where the concentration of these pollutants does not exceed the NAAQS levels is called an attainment area. Conversely, an area that is found to exceed this threshold may be classified as a nonattainment area (NEDEQ 2008). There are currently no, nonattainment areas in Nebraska (USEPA 2020b). In Wyoming, Goshen County is currently in attainment for all criteria pollutants (USEPA 2020c).

A significant amount of atmospheric dust can be generated from the mechanical disturbance of granular material exposed to the air. Dust generated from these open sources is referred to as fugitive dust. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations (USEPA 2019).

These sources of fugitive dust are caused by two basic phenomena:

- Pulverization and abrasion of surface materials by wheels, blades, etc.
- Wind erosion of an exposed surface by wind speeds over 12 mi per hour (mph; USEPA 2019)

The nearest active ambient air quality monitoring site to the Project is located in Scottsbluff, Nebraska, and measures PM smaller than 2.5 micrometers. Various other monitoring sites are located in or near Cheyenne, Wyoming, approximately 43 mi southwest of the Project (USEPA 2020a). In 2018, annual average daily traffic (AADT) flow through the Project was 2,920 trips along State Route- (SR-) 71; 280 trips along South CR-88; and 670 trips along North CR-88 (NEDOT 2020b). The AADT along CR-14/17 Mile Road was 30 trips in 2019 (NEDOT 2020a). Air quality monitoring in Scottsbluff and Cheyenne and the relatively constant winds at the Project, support the assumption that current conditions should not exceed state or NAAQS.

3.3.1 Climate

The analysis areas have a typical interior continental climate with hot summers and cold winters that vary in temperature seasonally and annually. Mean temperatures typically range from the upper teens in degrees (°) Fahrenheit (F) in colder months to the upper 70s °F in summer months, though extreme temperatures have fallen below -40 °F and have exceeded 115 °F. Because of its geographic position within the continent, weather in the Project is subject to frequent, dramatic changes due to interacting air masses. Much of the precipitation in late spring and summer is produced by thunderstorms forming in warm, moist air and can result in flooding (National Oceanic and Atmospheric Administration 2006). The average annual wind speed in Banner County, based on data collected from 1980 to 2010, is 21.75 mph (USA.com 2020).

3.3.2 Global Climate Change

Global climate change has manifested as increased global average temperatures, as well as changes to other regional aspects, such as precipitation patterns. Weather patterns at the Project typically result from wind and precipitation moving in from the Rocky Mountains to the west. Warmer temperatures in the Rocky Mountains are resulting in changes to a variety of the precipitation-related patterns, specifically earlier snowmelts and earlier runoff maxima. These changes can potentially lead to extended growing seasons and potential ecological effects. For instance, relatively early snow melts encourage premature plant development, and may alter the mix of plant species, especially in sensitive environments (Fleishman *et al.* 2013).

3.3.3 Environmental Consequences—Proposed Action

The types of impacts to air quality during construction of the wind turbines, transmission line, switchyard and Project substation would be similar and would primarily result from equipment emissions and generation of PM, including fugitive dust. Construction activities could release air emissions of criteria pollutants, VOCs, GHGs (including carbon dioxide), and relatively small amounts of hazardous air pollutants (HAPs). During construction of the Project, fugitive dust emissions would temporarily increase due to truck and equipment traffic, particularly on dirt and gravel roads and surfaces. A minor amount of fugitive dust generation is expected during construction from the concrete batch plant but would be minimized to levels below federal or state standards by implementation of Orion’s BMPs. Additionally, there would be relatively short-term emissions from diesel trucks and construction equipment. Air quality effects caused by fugitive dust would be relatively short term, limited to the periods of construction and decommissioning, and would not result in NAAQS exceedances or measurably contribute to GHG emissions. Estimated equipment use for construction of this Project is summarized in Table 3-9.

Table 3-8. Estimated equipment to be used during construction of the Pronghorn Flats 115-kilovolt Project.

Equipment	Purpose
Bulldozers	On-site construction
Graders	On-site construction
Rollers	On-site construction
Compactors	On-site construction
Trenching machines	On-site construction
Cranes—both light and heavyweight	On-site construction
Cement trucks	On-site construction
Drill rigs	On-site construction
Hydraulic forklifts	On-site construction
Semitrailers	Haulage, materials transportation
Water trucks	Haulage, materials transportation
Gravel Haulers	Haulage, materials transportation
Pickup trucks	Worker transportation
All-terrain vehicles	Worker transportation

Construction of the Project would bring approximately 10 heavy truck loads of materials per wind turbine. Additionally 50 vehicles trips during early phases of construction would be required. Approximately 75 personal vehicle trips would occur each day, assuming two passengers per vehicle. The emissions from this activity would not exceed air quality standards.

The types of impacts to air quality during maintenance of the wind turbines, transmission line, and substation would be similar and would primarily result from equipment emissions and generation of PM, including fugitive dust. Operating wind turbines, transmission lines, and other Project infrastructure would not directly result in air emissions because no fossil fuels would be combusted. Relatively negligible amounts of dust, vehicle exhaust emissions, and combustion-related emissions from diesel emergency generators would occur during O&M activities. These emissions would not cause exceedances of air quality standards. Operation of the substation could produce comparatively minute amounts of ozone and nitrogen oxide emissions as a result of atmospheric interactions with the energized conductors. Impacts on ambient air quality from these emissions during O&M of the Project would be relatively negligible.

The proposed substation may employ sulfur hexafluoride-filled circuit breakers, which are used in substations for all voltages. Sulfur hexafluoride is a GHG; therefore, equipment leaks could contribute to air quality impacts. Equipment would undergo routine inspection and preventative maintenance to minimize such leaks.

Global climate change is partly affected by the levels of GHGs in the atmosphere. The only relatively short-term contribution of the Project that could potentially affect climate change is equipment exhaust, primarily during construction. Emissions generated during O&M of the Project would primarily result from vehicles and machinery used to repair or maintain the Project infrastructure. These emissions would not make measurable negative contributions to global climate change. The Project would avoid considerable amounts of criteria pollutants, GHG, and HAP emissions that would otherwise have been generated from power plants burning fossil fuels to generate the equivalent electricity. Operation of the Project would offset total coal-generated emissions in Nebraska by approximately 552 short tons of sulfur dioxide, 263 short tons of nitrogen oxide, and 283,920 metric tons of carbon dioxide annually (U.S. Energy Information Administration 2020). These numbers were calculated assuming a 115 MW capacity as a proportion of the Nebraska 2019 Electricity Profile.

Activities required to decommission the Project would be similar to those for construction, but on a more limited scale and for a shorter duration. During decommissioning, the types of potential effects on ambient air quality and global climate change would be similar, but correspondingly less than those during construction activities.

Control techniques for fugitive dust sources generally involve watering, chemical stabilization, or reduction of surface wind speed with windbreaks or source enclosures. Watering is the most common and, generally, least expensive method, but provides only temporary dust control. The use of chemicals to treat exposed surfaces provides longer dust suppression, but may be costly, have adverse effects on plant and animal life, or contaminate the treated material. Windbreaks and source enclosures are often impractical because of the size of fugitive dust sources. The reduction of source extent and the incorporation of process modifications or adjusted work practices, both of which reduce the amount of dust generation, are preventive techniques for the control of fugitive dust emissions. Other mitigation measures entail the periodic removal of dust-producing material. Examples of mitigation control measures include clean-up of spillage on paved or unpaved travel surfaces and clean-up of material spillage at conveyor transfer points (USEPA 2019).

3.3.4 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on air quality or global climate change from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in similar emissions levels with the resulting impacts to air quality. Incremental contributions to global climate change from these activities would continue or increase, depending on future land uses.

3.4 Noise

The largest contributors to the existing sound sources within the general area of the Project are from farming activities and vehicular traffic. Section 18.03(7) of Kimball County Zoning and Subdivision Regulations (Kimball County 2010) indicates a noise standard of 50 decibels (dBA; metric not stated) at residences, and no noise limit is specified in Banner County. The Project has a self-imposed 45 dBA 1-hour equivalent sound level (L_{1h}) noise limit at residences (RSG, Inc. [RSG] 2020). There are no federal or state, or other county noise regulations applicable to this Project.

3.4.1 Environmental Consequences—Proposed Action

Construction of the Project is expected to take multiple months to a year or more from beginning to end. Construction of the Project would typically occur in several stages, and each stage would have a specific equipment mix. Most construction equipment would have sound levels ranging from 76 to 89 dBA at a distance of 50 ft. (Epsilon Associates, Inc. 2019, as cited by WAPA 2019). Most construction activities would occur during the day, when higher background sounds mask construction-related noise. However, concrete foundation work and turbine erection work could extend into the overnight hours depending on the weather and timing of a concrete pour, which must be continuous. Construction sound at any one location would only occur for a few days because as turbine construction in one area is completed, construction activities move to the next location.

During operation, the Project's wind turbines and substation would be a long-term source of sound. RSG conducted a sound propagation model for the Project (Appendix B, RSG 2020). Sound modeling software was used to estimate Project-generated operational sound at 30 discrete receivers, representing all homes within 1.2 mi of any wind turbine. The sound level assessment assumed 43 General Electric (GE) 3.03-140 low-noise trailing edges turbines with a hub height of 360 ft. For modeling sound from the substation transformer, sound emission data from the National Electronic Manufacturers Association Technical Report 1 Standard with spectral information from a transformer test was used.

The Project is modeled to produce a maximum sound level of 45 dBA L_{1h} or lower at residences in Kimball County and Banner County. It is expected that no adverse noise impact is expected to occur and the Project would meet any county noise standards.

The 115-kV transmission line would be a relatively minor source of noise typical of background sound levels in a rural environment. Based on a prior study of a 230-kV transmission line, 115-kV transmission line noise would be below 39 dBA at the edge of the ROW, even during wet weather (Lee *et al.* 1996 as cited by WAPA 2019). The collector lines would be underground and would not be a source of audible noise. Infrequent (about two hours once per month) operation of a diesel generator for testing at the O&M facility would be another source of sound; however, this would be intermittent, relatively short-term noise similar to construction activities. During decommissioning, sound levels would be similar to those used for construction, but on a more limited scale and for a shorter duration.

Human health effects sometimes alleged to wind farm noise and infrasound include sleep disturbance, vertigo, and stress. However, reliable evidence has not provided a link between infrasound and these adverse health effects. An independent expert panel for Massachusetts (Ellenbogen *et al.* 2012, as cited by WAPA 2019) found insufficient evidence that the noise from wind turbines directly cause human health effects. Instead, studies have linked the experience of adverse human health effects to individual perceptions and attitudes about wind farms. Thus, while studies have not reliably shown that wind farms cause direct health effects, negative attitudes about wind farms have been correlated with health effects such as sleep disturbance (Ellenbogen *et al.* 2012, as cited by WAPA 2019).

3.4.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on the existing sound levels from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in similar sound levels.

3.5 Vegetation

The analysis areas in Nebraska and Wyoming are located in the shortgrass prairie ecosystem (Schneider *et al.* 2005, WGFD 2017). The plant communities in this ecosystem include shortgrass, mixedgrass, sandsage prairie types, sparsely vegetated badlands, coniferous forest and playa wetlands. Shortgrass prairie is dominated by short grasses (e.g., buffalo grass, blue grama, side-oats grama, and purple threeawn) with hundreds of forb species interspersed. Mixedgrass prairie in this region is typically dominated by blue grama, prairie sandreed, threadleaf sedge, needle-and-thread, little bluestem, and western wheatgrass. Shrubs may be interspersed and may include yucca, fringed sage, broom snakeweed and skunkbush sumac. Similarly to the shortgrass prairie, hundreds of forbs are found in the mixedgrass prairie, including western ragweed, prairie coneflower, scarlet globemallow, scarlet gaura, and broom snakeweed.

Most of the turbine analysis area has been converted from shortgrass prairie to various land cover and uses (Table 3-10); however relatively large portions of the 115-kV transmission line analysis area contain shortgrass prairie that is used for livestock operations (Table 3-11). Cultivated crops cover approximately 18,871 acres (64%) of the turbine analysis area. Herbaceous vegetation (plants without woody stems), representing the shortgrass prairie ecosystem, is approximately 9,404.4 acres (31.9%), while 849.2 acres (2.9%) have been converted to developed, open space (e.g., roads) within the turbine analysis area (Table 3-10, Figure 3-8). Hay and pasture land use composes 282.2 acres (Table 3-10, Figure 3-8). Developed land covers are defined as areas characterized by a high percentage of constructed materials (e.g., asphalt, concrete, buildings) such as roads. The developed open space category has less than 20% impervious surface and the developed low intensity category has 20% to 49% impervious surface.

Table 3-9. Land cover within the Pronghorn Flats 115-kilovolt Project turbine analysis area

Land Cover Type	Acres	Percent
Cultivated Crops	18,871	64
Herbaceous	9,404	32
Developed, Open Space	849	3
Hay/Pasture	282	1
Developed, Low Intensity	5	<0.1
Barren Land	5	<0.1
Woody Wetlands	2	<0.1
Developed, Medium Intensity	0.2	<0.1
Total*	**29,418**	**100**

* Discrepancies due to rounding.

Source: National Land Cover Database 2016.

The dominant land cover type in the 115-kV transmission line analysis area is herbaceous vegetation at approximately 29,998.4 acres (69.3%; Table 3-11, Figure 3-8). The next most abundant land cover type is cultivated crops at approximately 11,190.4 acres (25.9%), followed by developed, open space at approximately 1,005.8 acres (2.3%). Hay/Pasture, evergreen forest, and barren land collectively compose approximately 1,029.3 acres or 2.4% of the transmission line analysis area.

Table 3-10. Land cover within the Pronghorn Flats 115-kilovolt Project transmission line analysis area.

Land Cover Type	Acres	Percent
Herbaceous	29,998.0	69.0
Cultivated Crops	11,190.0	26.0
Developed, Open Space	1,006.0	2.0
Hay/Pasture	647.0	2.0
Evergreen Forest	304.0	0.7
Barren Land	79.0	0.2
Developed, Low Intensity	29.0	0.1
Shrub/Scrub	15.0	<0.1
Emergent Herbaceous Wetlands	4.0	<0.1
Woody Wetlands	2.0	<0.1
Developed, Medium Intensity	0.2	<0.1
Open water	0.2	<0.1
Total*	**43,276.0**	**100**

* Discrepancies due to rounding.

Source: National Land Cover Database 2016.

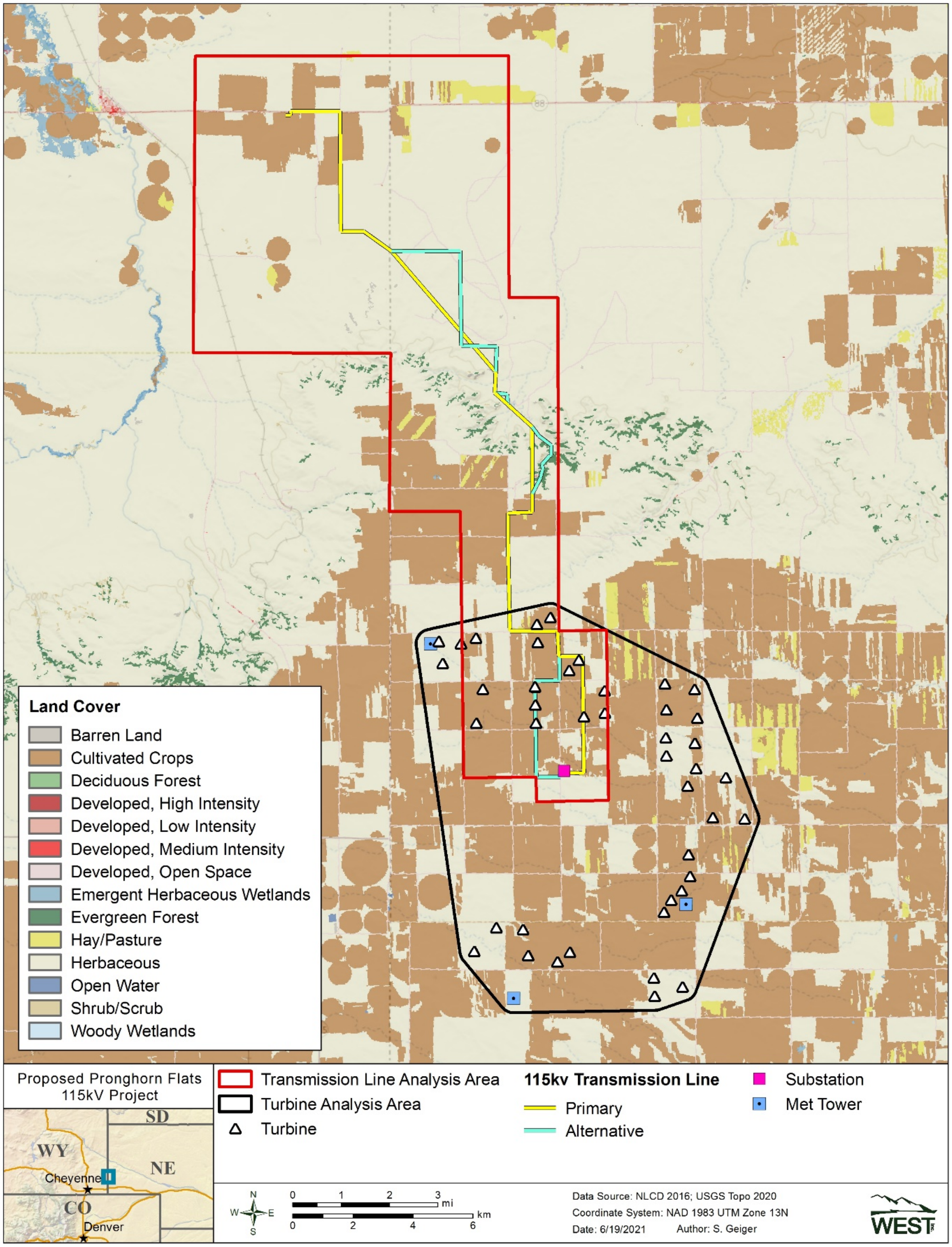

Figure 3-11. Land cover in the Pronghorn Flats 115-kilovolt (kV) analysis areas.

The Project's 115-kV transmission line routes falls within two Nebraska special vegetative communities. The Nebraska Natural Legacy Project identifies Biologically Unique Areas (BUL), which are areas that offer the best opportunities for the conservation of biological diversity. The 115-kV transmission line routes transverses the southwest portion of the Wildcat Hills South BUL (Figure 3-10). There are approximately 30 and 37 acres of the BUL within the primary and alternative transmission line routes, respectively. Additionally, Nebraska's Conservation and Environmental Review Tool (CERT; NGPC 2020a) identified that within the 115-kV transmission line routes (both primary and alternative) there are Level 2 "large intact blocks of habitat for at-risk species" (NGPC 2020a).

Plant species noted as noxious weeds are identified for the Nebraska and Wyoming analysis areas. The Nebraska Weed Control Association's (2020) noxious weed list includes saltcedar, purple loosestrife, phragmites, leafy spurge, Canada thistle, musk thistle, plumeless thistle, spotted knapweed, diffuse knapweed, Japanese knotweed, giant knotweed, and sericea lespedeza. These noxious weeds are identified by Nebraska's invasive species program as present in the Shortgrass Prairie ecoregion, which includes Banner and Kimball counties (Nebraska Invasive Species Program 2020). The State of Wyoming designates 30 plants as noxious weed species (Wyoming Weed and Pest Council 2020). Of those, the Goshen County Weed and Pest Control District (2020) identifies puncturevine, wild licorice, palmer amaranth, and horseweed as species that will have negative impacts in Goshen County.

3.5.1 Environmental Consequences—Proposed Action

Construction of the Project under the indicative layout of 43 turbines would have a temporary effect on approximately 439 acres of vegetation and a long-term impact on approximately 85 acres of vegetation (Table 3-12). The land cover type that will be impacted most is approximately 192 acres of cultivated crops, followed by 126 acres of herbaceous vegetation, and 120 acres of developed open space. Cultivated crops and herbaceous land covers comprise approximately 72% of the total acres temporarily impacted. While developed open space and herbaceous land cover comprise approximately 73% of the land cover that is impacted long term. Using the timescale on Google maps it appears most of the area impacted by the indicative layout has been cultivated between 1985 and the present.

Table 3-11. Approximate acres of land cover potentially impacted from turbines and turbine infrastructure at the Pronghorn Flats 115-kilovolt Project.

Land Cover Type	Temporary (acres)	Long term (acres)
Cultivated Crops	192	23
Herbaceous	126	26
Developed, Open Space	120	36
Developed, Low Intensity	1.0	0.3
Hay/Pasture	0.2	0.1
Total*	**439**	**85**

* Discrepancies due to rounding.

Source: National Land Cover Database 2016.

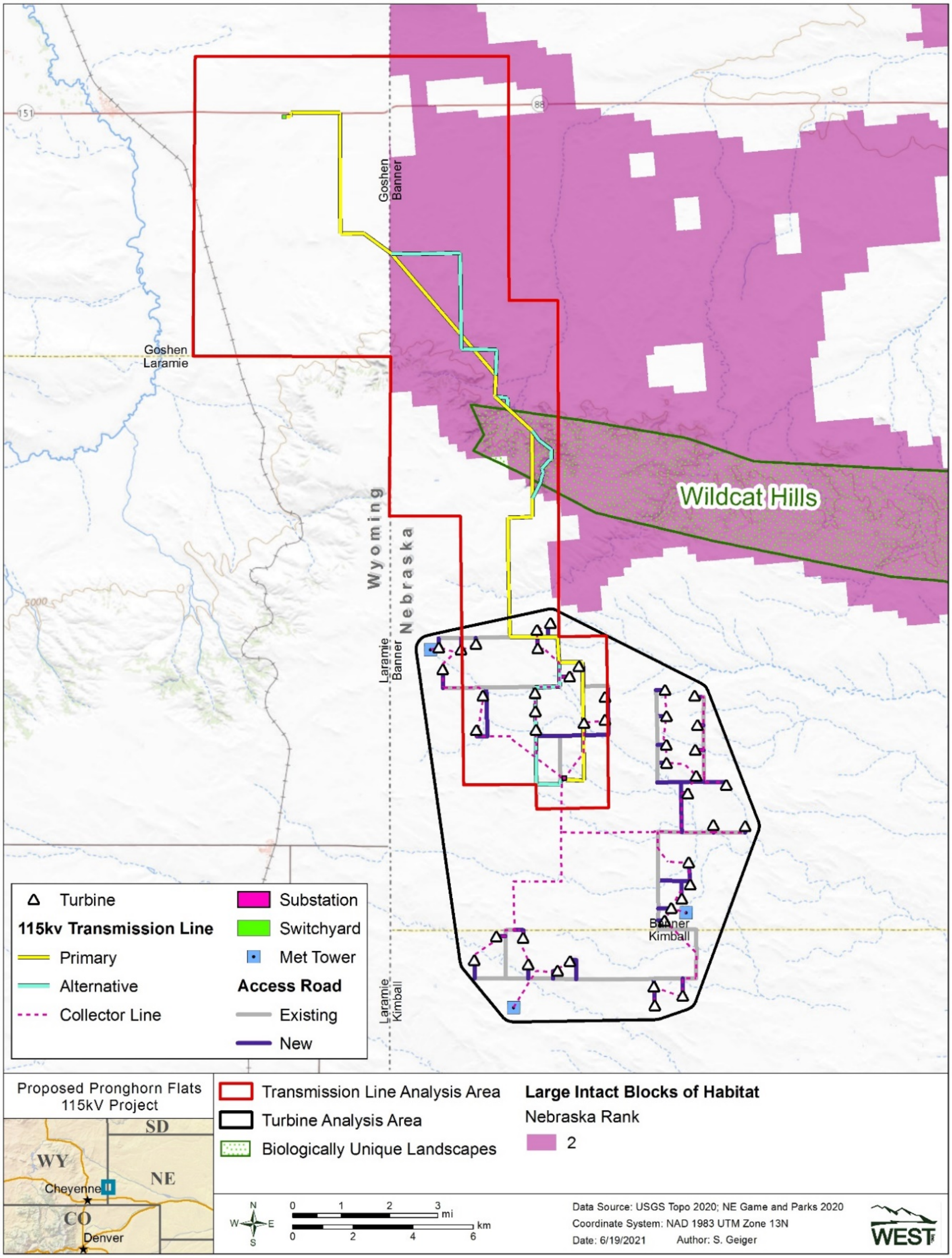

Figure 3-12. Level 2 "Large Intact Blocks of habitat for at risk species" within the Pronghorn Flats 115-kilovolt (kV) Project.

The primary and alternative transmission line routes would have approximately 349 and 387 acres of temporary impacts to vegetation types, respectively (Tables 3-13 and 3-14). The plant community herbaceous land cover will be impacted the most in the primary and alternative transmission line routes (approximately 194 and 200 acres, respectively), followed by cultivated crops (approximately 94 and 98 acres, respectively). Following construction, in either of the transmission line routes, the temporary impact areas would be reclaimed to pre-construction land uses. Thus, the long-term loss of vegetation from both the turbine infrastructure and primary transmission line combined would be approximately 85 acres. The potential for an additional five turbines and infrastructure (Table 2-2) would increase these impacts, but would likely occur within the cultivated crop or developed open space land cover.

Table 3-12. Approximate acreage of land cover potentially impacted from the 115-kilovolt primary transmission line route at the Pronghorn Flats 115-kilovolt Project.

Land Cover Type	Temporary	Long term
Herbaceous	194	negligible, <0.1 ac
Cultivated Crops	94	negligible
Developed, Open Space	51	negligible
Developed, Low Intensity	3	negligible
Evergreen Forest	3	negligible
Hay/Pasture	3	negligible
Barren Land	1	negligible
Total*	**349**	

* Discrepancies due to rounding.

Source: National Land Cover Database 2016.

Table 3-13. Approximate acreage of land cover potentially impacted from the 115-kilovolt alternative transmission line route at the Pronghorn Flats 115-kilovolt Project.

Land Cover Type	Temporary	Long term
Herbaceous	200.0	negligible, <0.1 ac
Cultivated Crops	98.0	negligible
Developed, Open Space	78.0	negligible
Evergreen Forest	4.0	negligible
Developed, Low Intensity	3.5	negligible
Hay/Pasture	2.8	negligible
Barren Land	0.7	negligible
Total*	**387.0**	

* Discrepancies due to rounding.

Source: National Land Cover Database 2016.

The proposed 115-kV transmission line routes would impact the Wildcat Hills South BUL and large intact blocks of Level 2 habitat for at-risk species. There are approximately 109 and 144 acres of the Level 2 blocks within the primary and alternative transmission line routes, respectively. In both transmission line routes and both the BUL and Level 2 habitat, herbaceous land cover was the dominant land cover type.

Isolated trees and shrubs may potentially need to be cleared as part of construction of the primary route 115-kV transmission line where approximately 3.0 acres of evergreen forest scattered/existing along the route. There are approximately 4.0 acres of evergreen forest scattered/existing along the alternative transmission line route. Tree removal would be limited to individual trees in the proposed transmission line route. Impacted trees would be replanted to achieve maturity within five to 10 years.

Construction activities have the potential to result in the spread of noxious weed species through site clearing activities exposing open soil. Weed establishment then can occur by construction equipment introducing seeds into new areas, wind-blown seed deposits, or erosion or sedimentation in the construction areas. Implementation of environmental commitments (Section 2.2) would reduce the potential for the introduction of noxious weeds.

The Project would be decommissioned at the end of the Project's operating life. The Project infrastructure would be removed in accordance with the wind lease, applicable state regulations, and county agreements, unless otherwise agreed to by the landowner. Disturbed surfaces would be graded, reseeded, and restored as closely as possible to the pre-construction conditions. Impacts from decommissioning would be similar to those for construction.

3.5.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on the existing vegetation from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in the same type and level of impacts to the vegetation as currently exist in 2020.

3.6 Wildlife

Potential impacts on wildlife and their habitats from the development of a utility-scale wind energy facility are well documented in a number of documents including the *Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement* (WAPA and USFWS 2015). Birds and bats are generally affected more than other wildlife and, thus, the focus of the analysis for this Project. Various wildlife studies were completed for the Project. These studies are included in Appendix C and are summarized in the subsections that follow.

3.6.1 Birds

3.6.1.1 Raptor Nest Surveys

Aerial raptor nest surveys were completed March 8 to March 12 and April 24 to April 25, 2017 (Fritchman 2017), and in 2019, on March 20 to March 24 with a follow up survey conducted on May 2, 2019 (Fritchman 2020), to locate and characterize the raptor nesting community in the area (Appendix C). The surveys yielded no occupied nor active raptor nests, including eagle, within the turbine analysis area. The closest and active eagle nest was approximately three mi from the nearest proposed turbine, which is outside of the expected territory size for nesting eagles. The USFWS indicates that surveys out to 2.0 mi from a project boundary sufficiently evaluates a project's impact to nearby nesting eagles (USFWS 2020). As indicated by the USFWS, risk becomes unlikely for nests greater than 2.0 mi of a wind energy project (USFWS 2020), therefore, impacts to nesting eagles at the Project are unlikely. There was one inactive raptor nest recorded in the turbine analysis area.

Three active raptor nests within the transmission line analysis area were recorded during the 2017 and 2019 surveys (Table 3-15). Ferruginous hawk, prairie falcon, and red-tail hawk active nests were recorded during 2017 surveys. One occupied but inactive (no nesting) golden eagle nest was also recorded. During 2019, there were two occupied and active ferruginous hawk nests and one active golden eagle recorded. Additionally in 2019, three golden eagle nests were recorded but only one was active.

Table 3-15. Summary of Raptor Nests along the Primary and Alternative Transmission Line Route

Year	Occupied (Species)	Status	Distance (mile) from Primary Transmission Line Route	Distance (mile) from Alternative Transmission Line Route
2017	Ferruginous hawk	Active	0	0.1
	Prairie falcon	Active	0.5	0.6
	Red-tailed hawk	Active	0.9	0.7
	Golden eagle	Not Active	0.6	0.6
2019	Ferruginous hawk	Active	<0.1	0.1
	Ferruginous hawk	Active	0.2	0.1
	Golden eagle	Active	0.4	0.4
	Golden eagle	Not Active/Occupied	0.3	0.4
	Golden eagle	Not Occupied	0.6	0.6

3.6.1.2 Avian Use Surveys

Avian use surveys for both large birds and small birds (e.g., passerines such as songbirds) were conducted from April 1, 2019 to March 11, 2020 and April 25, 2020 to May 26, 2021 (Fritchman and Taylor 2021). While the survey area has changed slightly between the survey years, survey points have maintained the required (30%) coverage in compliance with the USFWS *Land-based Wind Energy Guidelines* (USFWS 2012) within the current turbine analysis area.

During the 2019 to 2020 surveys, there were 24 large bird species recorded during surveys. Waterfowl and doves/pigeons accounted for most of the large bird observations throughout the study period, with Canada goose observed most frequently. Three bald eagle observations, 12 golden eagle observations, and two unidentified eagle observations were recorded during scheduled survey times. Bald eagle observations were only recorded in spring (1) and fall (2), while golden eagle observations were recorded during all seasons. Twenty-one species of small birds, all passerines, were recorded during surveys. The most commonly observed small birds were horned lark, Lapland longspur and lark bunting. These species are typical of this region and are widespread and abundant. Overall, the species composition, seasonal abundance, and spatial use patterns documented during these surveys are considered typical for birds in this region (Fritchman and Taylor, 2021). The majority of species observed are relatively common and abundant within the region (Fritchman and Taylor, 2021). Comparatively large flocks of waterfowl and/or shorebirds can be infrequently abundant during migration seasons, although stopover habitat that can potentially concentrate these species is generally rare within the analysis areas. No federal listed threatened or endangered species were observed during surveys or incidentally. No state-protected species were observed.

During the 2020 to 2021 surveys, 21 large bird species were recorded with waterfowl (sandhill crane; 144) and doves/pigeons (mourning dove; 164) most observed. Diurnal raptors were also the most frequently occurring group of birds during spring, fall, and winter with northern harrier (26), and Swainson's hawk (25) the most observed. Two golden eagles were observed during large bird surveys and one golden eagle was observed incidentally. Two golden eagle observations occurred in the fall. No bald eagles were observed during the 2020 to 2021 surveys. Twenty-five species of small birds were recorded during surveys. Passerines and woodpeckers accounted for all identifiable species of small birds. No federally threatened or endangered species were observed incidentally or during the 2020 to 2021 surveys (more information on listed species presented in Section 3.7). However, four individuals of Longspur, a Nebraska state-threatened species, were observed over the course of the year-long survey. Overall, the species composition, seasonal abundance, and spatial use patterns documented during the 2019 to 2020 surveys are considered typical for birds in this region and the majority of species observed are relatively common and abundant within the region (Fritchman and Taylor 2021). Over the course of the 2-year study, one bald eagle and three golden eagle were observed incidentally, outside of survey periods.

The turbine and transmission line analysis areas do not overlap with any Important Bird Areas, as identified by the National Audubon Society (2019), in Banner and Kimball counties, Nebraska, or Goshen County, Wyoming. The analysis areas also do not overlap with any Grassland Bird Conservation Area in Nebraska (USDA NRCS 2017).

3.6.2 Bats

Bat species whose range occurs, or that have documented observations in the analysis areas include: Townsend's big-eared bat, big brown bat, silver-haired bat, eastern red bat, hoary bat, long-legged myotis, western small-footed bat, little brown bat, fringed myotis, tri-colored bat (i.e., eastern pipistrelle), Mexican free-tailed bat, long-eared myotis, and pallid bat (Hester and Grenier 2005, University of Nebraska 2016). Species are either year-round residents, seasonal residents or noted as rare. The *Bat Assessment Guidance for Wind Energy Facilities in Nebraska* (University of Nebraska 2016) indicates wind energy is of special concern to many of these species.

Potential roosting habitat within the analysis areas in the form of trees, buildings, rocky cliffs, and rock outcrops was documented during a site visit (Baumgartner *et al.* 2014). Bats generally forage over water and open spaces such as agricultural fields, grasslands, streams, and wetlands/ponds. Agricultural fields and grasslands are common throughout the turbine analysis area, but streams, wetlands, and pools are uncommon. Bats may forage over the entire analysis area, although the extent of use is not known. However, little data are available from Nebraska on the foraging behavior, diet, and range of bats, with little knowledge of specific habitat use or seasonal requirements in the state.

Geluso *et al.* (2013) documented the western small-footed bat, silver-haired bat, fringed myotis, little brown bat, and eastern red bat in the Wildcat Hills South BUL, which the primary and alternative route for the 115-kV transmission line traverses a small portion of (Figure 3-9). Geluso *et al.* (2013) also presented studies documenting the presence of the tri-colored bat in eastern Wyoming and the long-legged myotis near Torrington, Goshen County, Wyoming.

3.6.3 Environmental Consequences—Proposed Action

Potential impacts to wildlife from the Project may result from direct mortality, habitat loss, and wildlife disturbance. Direct mortality is the result of collisions with turbines, met towers, overhead power lines, and substation structures. Habitat loss is due to the footprint of turbine pads, other infrastructure, and roads. Wildlife disturbance is the loss of the use of seemingly suitable habitat because of human activity in the vicinity. Orion would follow conservation measures noted in Section 2.2 of this EA to minimize impacts to wildlife populations.

Ground disturbance impacts would include temporary and long-term loss of habitats for wildlife. The turbine construction and associated infrastructure would result in approximately 411 acres of temporary and 85 acres of long-term impacts predominantly occurring (about 75%) within cultivated crops and developed open space land cover (Table 3-12). The construction of the transmission line would result in additional temporary impacts ranging from 353 to 391 acres and permanent impact of 0.10 to 0.12 acres from the transmission line structures (Table 3-13 and 3-14) predominantly occurring within herbaceous land cover. The potential for an additional five turbines and infrastructure (Table 2-2) would increase these impacts, but would likely occur within the cultivated crop or developed open space land cover. Long-term impacts include loss of habitat and habitat fragmentation due to the presence of the Project, as well as regular disturbance from humans during periodic maintenance. Specific impacts on wildlife are discussed below.

The general wildlife habitats within the turbine analysis area and the transmission line analysis area are representative of the region. Therefore, the potential effects from the development and operation of a wind energy facility is not likely to have any significant impact on the local mammals, reptile, or amphibian populations. They may experience a direct loss of potential habitat and individual fatalities due to collisions with increased vehicles in the area during construction. However, based on the number of long-term acres lost due to the presence of infrastructure and the relative abundance of these habitats on a regional scale the amount of impact is not expected to be significant.

Impacts to big game are expected to be minimal because the land is primarily cultivated crop and developed open space and is subject to regular human activity from farming activities. Impacts to big game could include direct mortality due to collisions with vehicles, loss of foraging habitat, and displacement from portions of the proposed Project area during construction due to human presence or noise. Mortality due to collisions with vehicles would be minimal. Forage distribution has already been substantially altered by past and current agricultural activities, and the footprint of the proposed wind Project likely would be unnoticeable within this larger agricultural environment. Big game using the area likely would habituate to the turbines and operation activities in time, although they may avoid roads as occurs at oil and gas development projects (Bureau of Land Management [BLM] 2008). Mule deer also are fairly tolerant of human activities (Reed 1981, Irby *et al.* 1981), and there is already frequent human presence due to farming activities, so it is probable that any displacement would likely be temporary and displacement effects would be minimal. Impacts to small mammals and carnivores include an increase in vehicle kills with increased roads and traffic, and some loss of habitat. The impacts are anticipated to be minimal overall.

Impacts to other mammals, amphibians, and reptiles are expected to be minimal. Mammals are relatively mobile, amphibians and reptiles are a little less so, and, while mortality due to collisions with vehicles or during excavation is possible, these occurrences are anticipated to be infrequent. As with big game, the overall agricultural environment already strongly influences forage/prey availability, therefore the loss of habitat from the Project footprint would probably have a minimal impacts on other mammals and reptiles.

3.6.3.1 Birds

3.6.3.1.1 Construction and Decommissioning

During Project construction and decommissioning, direct impacts to birds would include displacement (short term or long term), injuries or fatalities from collisions with construction equipment, vehicles, or Project components being installed or removed at the site. Displacement impacts are expected to be minimal since construction activities are localized, of short duration, and specific to individual birds present in the area; population level impacts are not expected. Species in the area are highly mobile and can temporarily move into the adjacent habitat to avoid localized and short-term construction activity.

Based on the raptor nest surveys conducted by Fritchman (2017, 2020) the closest occupied and active eagle nest is over 2.0 mi from the nearest proposed turbine, which is outside of the expected territory size for nesting eagles so the effect of displacement on nesting raptors is anticipated to be relatively minimal in the turbine analysis area. Additionally, Orion has identified BMPs that establish temporary wind turbine buffer zones around active raptor nests during construction in accordance with the *U.S. Fish and Wildlife, Region 6 Wildlife Buffer Recommendations for Wind Energy Projects version 3* (USFWS 2021b). Similarly, construction impacts to wetlands can lead to displacement of local birds in the Project area. The comparatively small amount of wetlands impacted by the Project during construction minimizes the potential impact to birds using these habitats.

3.6.3.1.2 Operations

During the long-term operational phase impacts may arise from maintenance activities and effects from, or interactions with, Project facilities and components. Maintenance activities may temporarily disturb birds. However, this impact would be localized, of short duration, and specific to individual birds present in the area; population level impacts are not expected. Wildlife that would be disturbed would be expected to temporarily move to surrounding habitat.

Effects from, or interactions with, Project facilities and components used for the operation of the Project may impact local birds due to habitat alteration. Habitat alteration from transmission line structures on the landscape would increase available perching and nesting sites for raptors (APLIC 2006). Perches in this open landscape would increase potential predation pressure on other wildlife.

Displacement of grassland nesting birds is often one of the primary concerns wildlife agencies express, regarding the placement of wind facilities in and near grassland areas. Recent research has focused on the potential displacement of grassland passerines at wind energy facilities, and some uncertainty currently exists over the effects of wind energy facilities on the breeding success of these birds. In Minnesota, researchers found that breeding passerine density on Conservation Reserve Program grasslands was reduced in the immediate vicinity of turbines (Leddy *et al.* 1999), but changes in density at broader scales were not detected (Johnson *et al.* 2000). Erickson *et al.* (2004) documented a decrease in density of some native grassland passerines, such as grasshopper sparrow, near turbines in Washington; however, they could not determine if a decrease in post-construction density was the result of behavioral disturbance or a loss of habitat. Piorkowski (2006) conducted a displacement study at a wind energy facility in Oklahoma where, of the grassland species present in the wind resource area, only the western meadowlark showed significantly lower densities near turbines. Piorkowski (2006) suggested that habitat characteristics were more important to determining passerine breeding densities than the presence of wind turbines. Shaffer and Johnson (2009) documented some avoidance by grasshopper sparrows out to 492 ft at a wind energy facility in northern South Dakota. Shaffer and Buhl (2016) looked at indirect effects of wind-energy on breeding grassland birds in the mixed grass-prairie of North Dakota and South Dakota. Shaffer and Buhl observed displacement, attraction and null effects on nine species of grassland birds. The authors note that displacement could be localized (within 328 to 984 ft) or could result in site abandonment. Seven of nine grassland-breeding birds displayed localized displacement behavior, with several species relocating territories farther from turbines without abandoning the sites completely. Displacement impacts could potentially not be realized at the population level in part because displaced birds are not precluded from breeding elsewhere (WAPA 2019). The proposed turbine analysis area and transmission line analysis area contains grassland/herbaceous cover, with the potential to support grassland sensitive species that have the potential to be impacted by development. Species potentially impacted include several grassland obligate species and area sensitive species such as the mountain plover, burrowing owl, lark bunting, and Longspur; however, grassland/herbaceous cover is prevalent throughout the region, therefore, significant adverse impacts to these species are not anticipated.

Some bird mortality would be expected at met towers, especially if guy wires are required. Derby (2006) found very few bird mortalities at unguyed and unlit cellular communication towers that ranged in height from 150 to 195 ft. Young *et al.* (2003) reported that the average bird mortality rate for guyed met towers at the Foote Creek Rim wind facility was 7.5 birds per tower per year. Extrapolating data from Foote Creek Rim and the proposed use of three met towers, it is estimated that the bird mortality at the Project would be 22.5 birds per year if guyed towers are used.

Fatalities from collisions with wind turbines or electrocution and collision with transmission lines could occur. Based on a review of other wind projects in the region, fatalities estimates, resulting from wind turbine collisions, for all birds (including waterfowl) ranged between 0.3 to 3.4 fatalities/MW/year (Western EcoSystems Technology, Inc. [WEST] 2021). The overall magnitude of the population impact is relatively low, particularly for passerines, because most (approximately 62%) of the documented avian fatalities in continental North America are passerines, with individual species experiencing small (less than 0.05%) direct impacts from collisions with wind turbines (Erickson *et al.* 2014, WAPA 2019).

Bald and golden eagles were observed on site during the avian surveys as described in Section 3.6.1. Bald eagles were only observed during the fall, while golden eagles were observed during all seasons. Breeding bald eagles prefer habitat with large trees, such as cottonwood trees, coupled with larger bodies of water or rivers. These features are not available in the turbine analysis area or the transmission analysis area. Breeding golden eagles prefer habitat with cliffs and large rock outcrops, coupled with open grassland. While the turbine analysis area generally lacks nesting habitat it does contain open grasslands that may provide foraging opportunities; however, prairie dog colonies, which increase the likelihood of eagles foraging in the area, were not recorded during avian surveys. There is a stretch of the transmission analysis area that offers some cliffs that could be used by golden eagles.

The USFWS has developed a collision risk model (CRM) in the Bayesian framework to predict annual take of bald and golden eagles (USFWS 2013). The CRM framework uses prior distributions for exposure rate and collision rate of eagles. Prior distributions are intended to model exposure rate and collision rate of eagles at a range of wind energy facilities. Project specific data are used to update the exposure rate distribution. The prior distributions were defined in New *et al.* 2018 and accepted by the USFWS in May 2021 (86 Federal Register 23978 [May 5, 2021]).

For additional consideration, WEST developed an additional take prediction for golden eagles that includes the exposure rate prior distribution developed by the USFWS and an alternative collision rate prior distribution for golden eagles presented in Bay *et al.* 2016. Project specific data are used to update the exposure rate prior distribution. However, for this alternative take prediction, the collision rate prior distribution developed in Bay *et al.* (2016) was used and includes data collected on golden eagle exposure and fatalities from 26 facilities with modern turbine specifications across North America.

USFWS recommends using the 60th credible interval (CRI) for bald eagles and the 80th CRI for golden eagles to predict take and uses these upper credible limits to be conservative (USFWS 2021). Using the 60th CRI, the take predictions using the USFWS exposure rate and collision rate prior distributions developed for bald eagles is 0.26 bald eagles per year. Using the 80th CRI, the take predictions using the USFWS exposure rate and collision rate prior distributions developed for golden eagles is 1.14 golden eagles per year. The predicted annual golden eagle fatality rate at the 80th CRI is 0.48 golden eagles per year using the USFWS exposure rate prior distributions for golden eagles and the collision probability prior distribution presented in Bay *et al.* 2016. These levels correspond with a Category 2[2], high or moderate, collision risk according to the Eagle Conservation Plan Guidance (ECPG; USFWS 2013).

The estimated level of take attributed to the Project needs to be considered in combination with other impacts to eagles in the area (USFWS 2013). When considering the cumulative impact of a Project the USFWS considers the density of the bald and golden eagles in the Eagle Management Unit (EMU) and the potential take within Local Area Populations (LAP). The LAP is calculated using an 86-mi buffer for bald eagles and 109-mi buffer for golden eagles around the Project footprint. The USFWS has established a 1% threshold for take within the Central Flyway EMU in which the Project is located. The USFWS has also identified take rates of up to 5% of the estimated total eagle population size at the LAP scale as the upper benchmark according to the BGEPA preservation standard (USFWS 2013).

For bald eagles, the local area encompasses 25,293 square mi (mi^2), all within the Central Flyway EMU. The LAP size, calculated using the density estimate for the Central Flyway EMU (0.027 bald eagle/mi^2), is approximately 682 bald eagles. The upper 5% benchmark would be about 34 bald eagles/year, and the LAP 1% benchmark would be six bald eagles/year (Table 3-16). The annual estimated take rate at the Project is below the 1% LAP benchmark and the upper 5% benchmark, suggesting that the estimate of take is within the preservation standard set forth under the BGEPA.

For golden eagles, the local area encompasses 39,993 mi^2, all within the Central Flyway EMU. The LAP size, calculated using the density estimate for the Central Flyway EMU (0.014 golden eagle/mi^2), is approximately 558 golden eagles. The upper 5% benchmark would be about 27 golden eagles/year, and the LAP 1% benchmark would be five golden eagles/year (Table 3-16). The annual estimated take rate at the Project is below the 1% LAP benchmark and the upper 5% benchmark. It should be noted that under the preservation standard, the USFWS has set take thresholds for golden eagles to zero with any permitted take requiring compensatory mitigation. However, as stated above, the predicted take would likely be below the 5% benchmark

[2] As defined in the ECPG, a project is in Category 2 – High or moderate risk to eagles if it: 1) has an important eagle-use area or migration concentration site within the project area but not in the project footprint, 2) has a species-specific uncertainty-adjusted fatality estimate between 0.03 eagles per year and 5% of the estimated species-specific local-area population size, or 3) causes cumulative annual take of the species-specific local-area population of less than 5% of the estimated local-area population size.

that was evaluated under the Eagle Rule Programmatic EIS suggesting that the USFWS would likely be able to issue a permit as long as the take is offset by compensatory mitigation

Table 3-16. Estimated thresholds and take estimates for bald and golden eagles for the Central Flyway Eagle Management Unit (EMU) and Local Area Population for the Pronghorn Flats Wind Project, Banner County, Nebraska.

Region	Species	Estimated Population Size	1% Threshold	5% Threshold	Estimated Annual Take (CRM Model)	% of Regional Population
Central Flyway EMU	Bald Eagle	26,253	262	1,313	0.26	0.001
Local Area Eagle Population		682	6	34	0.26	0.038
Central Flyway EMU	Golden Eagle	13,210	132	660	1.14	0.009
Local Area Eagle Population		558	5	27	1.14	0.204

CRM = Collison Risk Model.

These predictions indicate that there is a high or moderate risk to both bald and golden eagles. The Eagle Management Plan would be developed to avoid and minimize potential impacts to bald or golden eagles in accordance with the ECPG prior to construction.

Avian electrocution and collision with transmission lines are direct, long-term impacts that can also occur during the operational phase. Electrocution risk to birds on power line structures is directly related to a number of structural and biological variables, including voltage, structure size, structure material and configuration, and area bird species likely to perch on the structures (APLIC 2006). A perching bird's dimensions are integral in assessing the potential for it to make phase-to-phase (i.e., energized-to-energized) or phase-to-ground (i.e., energized-to-ground or to a neutral) contact with a power line structure. Typically, 115-kV transmission voltage would not present an electrocution risk to perching raptors; however, the structure material (e.g., wood, steel), distances between potential contact points, and structure configuration can vary and both are important in assessing potential risks to avian species.

Avian collision risk with overhead lines is not uniform, and determining the relative risk or exposure to birds is generally governed by the type of electric infrastructure in proximity to bird species potentially present and site-specific factors, such as habitat, line orientation to use areas, topography, weather, bird morphology, flight characteristics, and level of human influences (Olendorff and Lehman 1986; Bevanger and Brøseth 2001; Harness *et al.* 2003; Mojica *et al.* 2009, 2020; APLIC 2012; Bernardino *et al.* 2018). Biological variables that influence a bird species' susceptibility to line collision includes bird size and maneuverability, flight characteristics, vision, and behavior (Anderson 1978; Beaulaurier *et al.* 1982; Faanes 1987; Bevanger 1994; Janss 2000; Bevanger and Brøseth 2001; Harness *et al.* 2003; Mojica *et al.* 2009, 2020; Rollan *et al.* 2010; APLIC 2012; Bernardino *et al.* 2018).

Flight characteristics can be important, including a bird's altitude and flight speed when approaching an overhead line (Beaulaurier *et al.* 1982). During daily movements, crossing power lines at low altitudes several times a day puts birds at a greater exposure for potential line collision (Willard 1978), as does flying in low light or during inclement weather (Faanes 1987, Morkill and Anderson 1991, APLIC 2012). Other factors important in assessing avian collision risk include power line configuration and the number of horizontal planes to navigate by flying birds. The overhead ground wire(s) and/or optical ground wire(s) on transmission structures is not energized but is smaller in diameter than the electric conductors, which reduces the overhead/optical ground wire line visibility and increases collision risk (APLIC 2012).

Based on these factors, species of large, heavy-bodied birds with large wingspans and lower maneuverability, such as cranes, herons, swans, pelicans, and geese, have been shown to be more susceptible to power line collisions. Other susceptible species include smaller, heavy-bodied birds that are fast fliers with short, wide wings, such as ducks, rails, coots, and grebes (APLIC 2012). Therefore, waterfowl and waterbirds are generally considered to be higher at-risk species of overhead power line collisions, as compared to other bird species. During the 2019 to 2020 survey, waterfowl (primarily Canada goose) accounted for a majority of the large bird observations, most notably in spring, but also in fall (Fritchman and Taylor 2021). Canada goose is common, geographically abundant, and likely to be unaffected by potential power line collisions associated with the proposed transmission line.

Few studies have documented eagle and other raptor collisions with overhead power lines. Research has suggested bald eagle collisions are more likely to occur where lines intersect with commonly used movement corridors and where birds are flying lower in altitude, such as near nest sites, winter concentration roosts, and along foraging sites (Olendorff and Lehman 1986; Harness *et al.* 2003; Mojica *et al.* 2009, 2020). Specific to golden eagle collisions with overhead power lines, input from some western electric utilities has indicated collisions with overhead lines are infrequent and appear to be random in location. Formal data compilation both in the U.S. and internationally documented nine golden eagle collisions with overhead power lines (Olendorff *et al.* 1986). Another study reported three golden eagle carcasses found mid-span below distribution power lines in Colorado and an additional 21 golden eagle carcasses found mid-span under a utility's power lines in Montana (Harness *et al.* 2003). While most of the birds in Montana were isolated cases, three carcasses were located near an active golden eagle nest, less than 1.0 mi from a prairie dog colony (Harness *et al.* 2003). Another carcass was found in a position indicative of pursuing prey (Harness *et al.* 2003). Although the sample size is low, these results suggest similar collision risk factors for golden eagles as bald eagles.

Implementation of environmental conservation measures (Section 2.2) during all phases of the Project would reduce the potential for avian mortality, indirect effects, and population-level effects. A BBCS and an Eagle Management Plan will be prepared that identify post-construction monitoring to confirm the pre-construction risk analyses and will include adaptive management measures, if needed, in consultation and coordination with agencies.

3.6.3.2 Bats

3.6.3.2.1 Construction and Decommissioning

During Project construction and decommissioning, direct impacts to bats could include displacement (short term or long term), fatalities from collisions with construction equipment, vehicles, or Project components being installed or removed at the site. Displacement impacts are expected to be minimal, and roosting habitats are not likely to be affected by the Project; population level impacts are not expected. Species in the area are highly mobile and can temporarily move into the adjacent habitat to avoid localized and short-term construction activity. Construction and operation of the Project would include both direct and indirect impacts to bats. Limited bat habitat is present within the turbine analysis area. Therefore, potential direct impacts to bat habitat would be minor. While the Project is likely to result in some bat mortality during operations, it is expected that the mortality rate would be within the average range of bat mortalities found throughout the U.S. based on general vegetation and landscape characteristics. Bat mortality at other Wyoming and Nebraska facilities ranges from 1.05 to 3.96 bat fatalities/MW/year (WEST 2021). Bat fatalities due to collisions with met towers at wind energy facilities appear to be very low to nonexistent (Johnson *et al.* 2004). Derby (2006) found no bat mortalities at unguyed and unlit cellular communication towers that ranged in height from 150 to 195 ft.

The Project also would potentially result in indirect impacts, such as habitat loss and/or alteration and the displacement or disturbance of bat species. However, because there is limited bat habitat within the turbine analysis area, the potential indirect impacts from the turbines and associated infrastructure would be limited. Bat habitat does exist within the transmission line analysis area; however, the potential impacts would primarily be related to construction, which would be a temporary impact. Impacts from Project decommissioning would be similar to those temporary aspects described for wildlife during construction.

Orion would follow conservation measures, noted in Section 2.2 of this EA, to minimize impacts to bat populations. Additionally, conservation measures for avoidance, minimization and mitigation listed in the *Bat Assessment Guidance for Wind Energy Facilities in Nebraska* (University of Nebraska 2016) and would be considered and implemented as practicable.

3.6.4 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on wildlife from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in the same type and level of impacts to the wildlife as currently exist.

3.7 Threatened and Endangered Species

3.7.1 Federally Threatened and Endangered Species

A formal request for an official list of species recognized as threatened or endangered under the ESA that could occur in the Project location, and/or possibly be affected by the Project, was made to the USFWS Information for Planning and Consultation System (IPaC; USFWS 2022). The report issued by both the Wyoming and Nebraska USFWS Ecological Services Field Office are provided in Appendix D. The report identified piping plover (threatened), whooping crane (endangered), pallid sturgeon (endangered), and the western prairie fringed orchid (Orchid; threatened) as species possibly occurring or known to occur within or be affected by the Project. No critical habitat has been designated for these species within the Project's analysis areas. These species are also the primary focus for the Platte River Recovery Implementation Program (PRRIP) established in 2006. The PRRIP implements actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Colorado, Nebraska, and Wyoming, and the U.S. Department of the Interior (PRRIP 2006). The PRRIP addresses the adverse impacts of existing and certain new, water-related activities on the Platte River target species and associated habitats, and ESA compliance for effects to the listed target species and whooping crane critical habitat from such activities including avoidance of any prohibited take of such species (PRRIP 2006). The water use for this Project would not require new or additional permits, but rather the Project will obtain temporary agreements with private landowners, the counties, or other water providers in the area. Water use will be consistent with the PRRIP and, therefore, there would be no new effects to the target species.

3.7.1.1 Piping Plover

Piping plovers in Nebraska are closely associated with the Platte River east of Lake McConaughy and lower reaches of other major rivers. In Nebraska, piping plovers breed along the Missouri, Platte, Elkhorn, Loup, and Niobrara rivers. The distance between the Project and the Platte River reduces the potential for their onsite occurrence during migration, breeding, or dispersal. Because of the distance between the Project and the associated rivers in Nebraska, lack of habitat within the analysis areas, and the review of state databases (NGPC 2020c, Wyoming Natural Diversity Database [WYNDD] 2020) it was determined the presence of and potential for the Project to affect the piping plover would be unlikely. Therefore, the piping plover was eliminated for further analysis.

3.7.1.2 Whooping Crane

The Project area is over 100 mi west of the documented migration corridor of the Aransas/Wood Buffalo population of whooping cranes. There have been no confirmed sittings in Banner or Kimball County, Nebraska (Silcock and Jorgensen 2021b). Based on the location of the Project relative to the migration corridor and the lack of sightings in the counties, it was determined the presence of and potential for the Project to affect the whooping crane would be unlikely. Therefore, the whooping crane was eliminated for further analysis.

3.7.1.3 Pallid Sturgeon

A small number of pallid sturgeon have been captured along the lower reaches of the Platte River in Nebraska. The lower reaches of the Platte River, a more than 30-mi stretch from the Elkhorn River to its confluence with the Missouri River, is believed to have suitable spawning habitat for pallid sturgeon. While the pallid sturgeon does not occur within the analysis areas, effects from potential changes in water depletions need to be considered to comply with the PRRIP and ESA. Water use will be consistent with the PRRIP and, therefore, there would be no new effects to the target species.

3.7.1.4 Western Prairie Fringed Orchid

The Orchid occurs most frequently in sedge meadows and remnant tallgrass native prairies that often include big bluestem, little bluestem, switchgrass, indiangrass, and northern reedgrass assemblages. The Orchid requires a constant source of reliable hydrology, such as sub-irrigated sedge meadows that rely on near-surface groundwater and its estimated current range is primarily northcentral Nebraska that does not include Kimball or Banner counties (Nebraska Natural Heritage Program [NNHP] 2019). The analysis areas are not located within the range of this species, thus the presence of and potential for the Project to affect the Orchid would be unlikely. Therefore, the Orchid was eliminated for further analysis.

Therefore, no species listed under the ESA are considered further in this analysis.

3.7.2 Species of Special Concern

Species of special concern for this Project include USFWS Birds of Conservation Concern (BCC; USFWS 2008), identified through the USFWS IPaC report, and Nebraska and Wyoming Species of Greatest Conservation Need (SGCN; WGFD 2017, Schneider *et al.* 2018). The BCC are bird species recognized by USFWS as having high conservation priority and are likely to become candidates for listing under the ESA without conservation actions. At a state-level, the Longspur (aka: McCown's longspur), mountain plover and swift fox are identified by both, or either, WGFD and the NGPC as SGCN, and have the potential to occur in the analysis areas (NGPC and NNHP2017).

3.7.2.1 Thick-billed Longspur

The Longspur is state-listed threatened in Nebraska with a significant conservation concern throughout its range (Panella and Jorgensen 2018). The Longspur is noted to be a locally common breeder in the western panhandle of Nebraska (Silcock and Jorgensen 2021a), which includes most of Kimball County and southern Banner County. The Longspur is a bird of the shortgrass prairie and is found using areas with little vegetative cover or bare ground, e.g. agricultural fields, grazed shortgrass prairie and prairie dog towns (NGPC 2018). This species has documented occurrences within one mile (NGPC 2020a) of the Project analysis areas and within the turbine analysis area during the 2020 to 2021 avian use surveys. In Wyoming, it is considered a regular summer inhabitant of Goshen County, however, there are no documented occurrences listed in the WYNDD (2021) within at least one mile of the transmission line analysis area.

3.7.2.2 Mountain Plover

The range of the mountain plover is distributed throughout the Shortgrass Prairie Ecoregion, which includes the analysis area in Nebraska and Wyoming (NNHP 2011). Mountain plovers use shortgrass agricultural fields, prairie dog towns, and areas with very low-stature vegetation and extensive bare ground (NGPC 2020c). Mountain plovers are noted as relatively common breeders, and spring and fall migrants, in Kimball County and southwest Banner County, Nebraska (Silcock and Jorgensen 2020). NGPC (2020c) indicate that in Nebraska, at least 90% of mountain plover nest on cultivated land. While no observations occurred during the 2019 to 2020 avian use surveys (Fritchman and Taylor 2021), CERT reported documented occurrences within one mi of the Project (NGPC 2020a). There are also observations recorded on eBird in the Project vicinity as recent as 2020 (eBird 2020). The breeding season runs approximately from April through July (Silcock and Jorgensen 2020). Within Wyoming, no observations have been recorded in the WYNDD in or near the transmission line analysis area. However, the species has been observed elsewhere in Goshen County, Wyoming (WYNDD 2020).

3.7.2.3 Swift Fox

Swift foxes are the smallest wild canine in North America and are about half the size of red foxes. While the historical range of the swift fox was the entire Great Plains region, the species is now limited to just the western edge of this range (NGPC 2020b). Swift foxes use the Shortgrass Prairie ecoregion where there are relatively few shrubs and trees. Swift foxes will use a den year-round, switching den sites throughout the year and often using the dens of prairie dogs and badgers. Often, swift foxes will also den in road ditches because coyotes (a major predator of the swift fox) do not typically inhabit road ditches (NGPC 2020b). The main part of this species' diet includes small mammals (prairie dogs and ground squirrels), birds, reptiles, amphibians, fish, and insects. In Nebraska, the population of swift foxes exists only in the southwest corner of the state and in the panhandle, which includes Banner and Kimball County, Nebraska. CERT reported documented occurrences within one mi of the Project (NGPC 2020a). In Wyoming, recent observations are documented in Goshen County (WYNDD 2020); however, these observations were not in the immediate analysis area.

3.7.2.4 Other Species of Special Concern

Other state SGCN includes the Colorado butterfly plant, which could occur in Kimball County, but is not expected to occur in the analysis areas (NGPC 2020a) and WGFD (A. Losch, WGFD, pers. comm., June 26, 2020; WGFD 2020) identified an additional six SGCN species with modeled distribution in the analysis areas: upland sandpiper, ferruginous hawk, long-billed curlew, burrowing owl, Preble's meadow jumping mouse, and western small-footed myotis.

3.7.3 Environmental Consequences—Proposed Action

3.7.3.1 Thick-billed Longspur

Direct mortality due to collisions are possible since there are some documented occurrences within the turbine analysis area (WYNDD 2020). Indirect effects from habitat fragmentation or loss of breeding/nesting habitat have probably already occurred to some degree as a result of agricultural development in the area. The Longspur has been documented nesting in agricultural fields in Kimball County, Nebraska (Snyder and Bly 2009 in Panella and Jorgensen 2018). It is unknown if the Project would result in compromising the security or recovery of the Longspur; however, Erickson *et al.* (2014), estimated levels of passerine fatalities at wind projects are such that impacts to any individual passerine species would not likely affect overall population levels. Surveys in and around the wind turbine sites to ensure species are not present prior to construction activities are included as Environmental Conservation Measures and Best Management Practices (Section 2.2) reducing the potential for direct impacts during construction.

3.7.3.2 Mountain Plover

Overall, it is unknown if the Project would result in compromising the security or recovery of the Nebraska state-listed threatened, mountain plover. Direct mortality due to collisions are possible since there are documented mountain plover occurrences within one mi of the analysis areas (WYNDD 2020). Orion commits to following the BMPs in Section 2.2 to reduce any potential impact to mountain plover during construction, operations, and decommissioning. The WGFD and NGPC recommends conducting surveys for mountain plover prior to construction activities to ensure breeding and nesting individuals are not present (A. Losch, pers. comm., June 26, 2020; WGFD 2020, NGPC 2021). If an active nest is located during the surveys, Orion will consult with either the WGFD or NGPC to determine appropriate measures to be implemented. Measures typically include applying an appropriate buffer (based on topography and type of disturbance) around the active nest for the duration of the breeding season (approximately April to July) within which disturbance would be restricted. Indirect effects due to loss of breeding/nesting habitat is expected to be low as agricultural fields are widespread in the analysis areas. While prairie dog colonies are not present in Kimball and Banner counties (McCarthy 2020), there are sizeable populations of prairie dogs in neighboring counties (Cheyenne, Morrill, and Scotts Bluff). Therefore, this infers that within Banner and Kimball counties, presently there is limited nesting habitat in prairie dog colonies for mountain plovers.

3.7.3.3 Swift Fox

Overall, the Project is not expected to compromise or enhance the security or recovery of the swift fox. Direct fatalities due to collision with vehicles could occur during construction, operations, and decommissioning. Indirect effects are expected to be relatively low since the Project's effect to native habitat would be incremental to the historic loss of suitable habitat (shortgrass prairie) through conversion to agricultural lands. While prairie dog colonies are not present in Kimball and Banner counties (McCarthy 2020), there are sizeable populations of prairie dogs in neighboring counties (Cheyenne, Morrill, and Scottsbluff). Therefore, this infers that within Banner and Kimball counties, presently there is limited swift fox habitat

3.7.4 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on federally or state-listed threatened or endangered species from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in the same type and level of impacts to the threatened and endangered species as currently exist in 2020.

3.8 Visual Resources

Visual resources refer to all objects (man-made and natural) and features (e.g., landforms and water bodies) visible on a landscape. The analysis area for visual resources is the area within a 30-mi radius of the Proposed Action wind turbines, which is considered the outer limit of visual effects under normal circumstances (Sullivan *et al.* 2012). This visual resource analysis area is the same whether the primary or alternative transmission line route is selected, and is inclusive of the indicative Project layout.

Visibility is considered very high and visual absorption capacity is comparatively low in the analysis area due to the relatively flat to rolling terrain and the uniformity of relatively low-growing vegetation. Exceptions are relatively low drainages where most settlements are concentrated, and areas screened by the Wildcat Hills in the north and northeast portions of the analysis area. The primary viewing platforms are Interstate 80 (I-80), Hwy 85, Hwy 88, Hwy 71, Hwy 30; state wildlife and recreation areas in the Wildcat Hills (Carter Canyon Ranch, Montz Point, Cedar Canyon, and Wildcat Hills); and the relatively small towns of Bushnell, Kimball, Dix, Harrisburg, Nebraska, and La Grange, Hawk Springs, Albin, Hillsdale, Burns, Pine Bluffs, and Carpenter, Wyoming. Outside of these towns, population density is considered very low. Table 3-17 describes 12 representative Key Observation Points (KOPs) selected to indicate public viewing locations from a stationary (e.g., recreational site or cemetery) or a linear (e.g., Hwy or trail) location.

Table 3-1714. Key Observation Points (KOP).

KOP Number. Name	Viewer Sensitivity–Special Designation	Viewer Number	Visual Quality	Degree of Impact	Distance from Nearest Turbine(mi)	Distance from Transmission Line (mi)
	(High, Moderate, Low, Negligible)					
1. Pine Bluffs, WY	High–Shrine	Moderate	Low	Moderate	14	Not Visible
2. Salem Cemetery, WY	High–Cemetery	Low	Moderate	High	7	Not Visible
3. Albin, WY	High–Town	Moderate	Moderate	High	3	5
4. Albin Cemetery, WY	High–Cemetery	Moderate	Moderate	High	0.75	Not Visible
5. Epworth Cemetery, NE	High–Cemetery	Low	Moderate	High	2.5	1
6. La Grange, WY	High–Town	Moderate	Low	Moderate	13	Not Visible
7. La Grange Cemetery, WY	High–Cemetery	Moderate	Moderate	Moderate	13	Not Visible

Table 3-1714. Key Observation Points (KOP).

KOP Number. Name	Viewer Sensitivity–Special Designation	Viewer Number	Visual Quality	Degree of Impact	Distance from Nearest Turbine(mi)	Distance from Transmission Line (mi)
	(High, Moderate, Low, Negligible)					
8. Gabe Rock Cemetery	High–Cemetery	Moderate	Moderate	High	8	Not Visible
9. Brauer Reservoir	Low–None	Low	High	High	3	Not Visible
10. Carter Canyon 1	Moderate–Recreation	Moderate	High	None	Not Visible	Not Visible
11. Carter Canyon 2	Moderate–Recreation	Moderate	High	Moderate	19	Not Visible
12. Murray Lake	Low–None	Low	Moderate	Moderate	18	Not Visible

mi = miles.

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.* 2018, Gross 2020). The special designations above, and the larger populations near Scottsbluff, Nebraska, indicate that viewer sensitivity is higher in the north and northeast. Conversely, the lack of similar special designations, tourist and recreation destinations, and smaller populations in the remainder of the analysis area indicates lower visual sensitivity.

The Project is located in the Western High Plains ecoregion, which is characterized by a semi-arid to arid climate, with annual precipitation ranging from 13 to 20 inches. The scenic qualities that contribute to its landscape character are green and brown flat to rolling plains, timbered drainages and bluffs, and in the northeast, bluffs, escarpments, and areas of exposed bedrock (Omernik 1987, USEPA 2000). The analysis area consists of rural settlements with ranching and farming associated structures, as well as energy extraction and transmission dotting the region. The road network is typically a gridded pattern, and roadways are predominantly composed of gravel. Despite the lack of generally striking features, the analysis area overall has moderate to high visual coherence, that is, integrity in its cultural order and intactness of the natural and human-built landscape in its freedom from encroaching elements.

3.8.1 Shadow Flicker

Potential visual impacts from Project operation could result from shadow flicker. Shadow flicker occurs when wind turbine blades pass in front of the sun to create recurring shadows on an object. Such shadows occur only under very specific conditions influenced by sun position, wind direction, time of day, and other similar factors. Shadow flicker becomes less noticeable with increasing distance from a wind turbine. 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. At such distances, shadow flicker is typically only caused at sunrise or sunset, when cast shadows are sufficiently long and are generally greater in the winter months due to the angle of the sun. Shadow flicker impacts are not currently regulated in applicable state or federal law. The general practice is to limit shadow flicker resulting from wind turbines to 30 hours per year at any residence (Haley and Partner 2020).

3.8.2 Environmental Consequences—Proposed Action

The wind turbines would change the aesthetics of the landscape with the addition of relatively tall, white towers, rotating blades, and red blinking lights at night. The substation, access roads, overhead transmission line, O&M buildings, 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 will have.
- Angle of Observation—viewing a project from different angles, such as from above or below the project, can greatly 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 it will create.
- Relative Size or Scale—the 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 of a landscape.
- Motion—Movement, such as spinning wind turbine blades, draws attention to a project and increases the amount of contrast.

Construction activities could potentially 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. In particular, because of the relatively large size of wind turbine towers, blades, and other components, the transport and installation of wind turbines and associated dust clouds are 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, and associated visual impacts would vary in accordance with construction activity levels. Site monitoring, adherence to standard construction practices, and restoration activities would reduce many of these potential visual construction impacts.

The primary direct visual impacts associated with operation of the Project would result from the introduction of the numerous vertical lines of the up to 48 wind turbines into the generally horizontal landscape found in the analysis area. Shadow flicker and blade glinting, as well as turbine marker lights and other lighting on other Project facilities, would also result in visual impacts.

The magnitude of impacts from an up to 600-ft tall wind turbine is largely proportional to distance. A conservative analysis suggests that, to the unaided eye and under optimal viewing conditions, wind turbines would be discernible beyond the 30-mi radius analysis area, though at this distance the impact would be considered negligible. Wind turbine blade movement would be visible and unlikely to be missed by casual observers at 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 Proposed Action wind turbine viewshed map (Figure 3-11), with visibility screened in some locations by topography and landscape features. The wind turbines would be visible from Albin, Pine Bluffs, and La Grange, Wyoming, and Bushnell, Kimball, Dix, and Harrisburg, Nebraska. Wind turbines would not be visible from the lower elevations in Scottsbluff, Terrytown, or Gering, Nebraska. Segments of the California, Oregon, Mormon Pioneer, and Pony Express National Historic Trails, and the associated Western Trails Scenic Byway and Gold Rush Scenic Byway, would also not have a view of the Project. The tips of the blades (at up to 600 ft. tall), though not the center of the rotor hub (at 360 ft. tall), would be seen at additional locations and further distances, such as the highest points in the southern portion of Scotts Bluff National Monument.

Current FAA requirements for wind turbine lighting (FAA 2018) typically includes red, simultaneously pulsating nighttime lighting and no daytime lighting (as white towers are sufficiently conspicuous to pilots). Orion is preparing a lighting plan to meet FAA requirements while minimizing the number of lights for the Project. Typically, not all turbines would be lit; rather, turbines at the end of each string and the third or fourth turbine in a string would be lit.

It is assumed that standard, simultaneously pulsating, red, nighttime lights would be necessary per FAA requirements (FAA 2018), and that an Aircraft Detection Lighting System would not be used. Aircraft Detection Lighting Systems temporarily activate red nighttime lights only when aircrafts enter the airspace and remain lit until approximately 30 seconds after the aircraft leaves the airspace. Night-sky contrasts would be relatively substantial in the rural, undeveloped analysis area because there are comparatively few other light sources, no similar simultaneous pulsating red lights, and a generally featureless dark background. The lights can potentially be visible for more than 20 mi, depending on atmospheric conditions, and the lights can create comparatively strong long-term visual impacts (Sullivan *et al.* 2012).

At least two 115-kV, one 230-kV, and a 345-kV transmission line cross the analysis area, converging near La Grange, Wyoming (National Renewable Energy Laboratory 2005, Hamerlinck 2016). The existing transmission lines feature steel lattice, steel monopole, and wood H-frame towers at heights shorter than the wind turbines. The proposed primary 115-kV transmission line (20-mi long) or alternative 115-kV transmission line (21-mi long) would be a new visual feature in the landscape. The magnitude of impacts from an approximately 115-ft tall transmission line is largely proportional to distance from a point of view. A conservative analysis suggests that the unaided eye and under optimal viewing conditions, transmission lines would be discernible beyond eight mi, though at this distance the impact would be considered negligible. At 3.5 mi, the transmission line would be clearly visible and would have a moderate level of impact. At 1.5 mi, there would be a relatively major visual impact, with the transmission line dominating the landscape (Sullivan et. al. 2012). Visual impacts within eight mi of the primary 115-kV transmission line versus the alternative 115-kV transmission line are depicted in Figure 3-12. The visual impacts are considered very comparable between the two routes for the 115-kV transmission line.

Decommissioning impacts would be similar to the impacts described above for construction; however, the impacts would be of lesser magnitude and limited to approximately six months.

The visual contrast between each KOP listed in Table 3-15 has a unique visual impact depending on the topography and the distance from the turbines and transmission line. The KOPs were selected based on where people likely congregate and where visual impacts can potentially be the highest. Towns, recreation sites, and sensitive cultural sites were all considered when determining the KOP locations. Table 3-17 describes each KOP based on viewer sensitivity, viewer number, visual quality, the approximate distance from the nearest turbine/transmission line, and also shows a summarized degree of impact at each location.

Each KOP was surveyed on April 24, 2020. A 52-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 help visualize the impacts to the existing landscape shown in Figures 3-13, 3-14, and 3-15. The three KOP locations (Albin Epworth, and La Grange) were chosen based off the severity of the visual impact at varying distances as illustrated in Table 3-17.

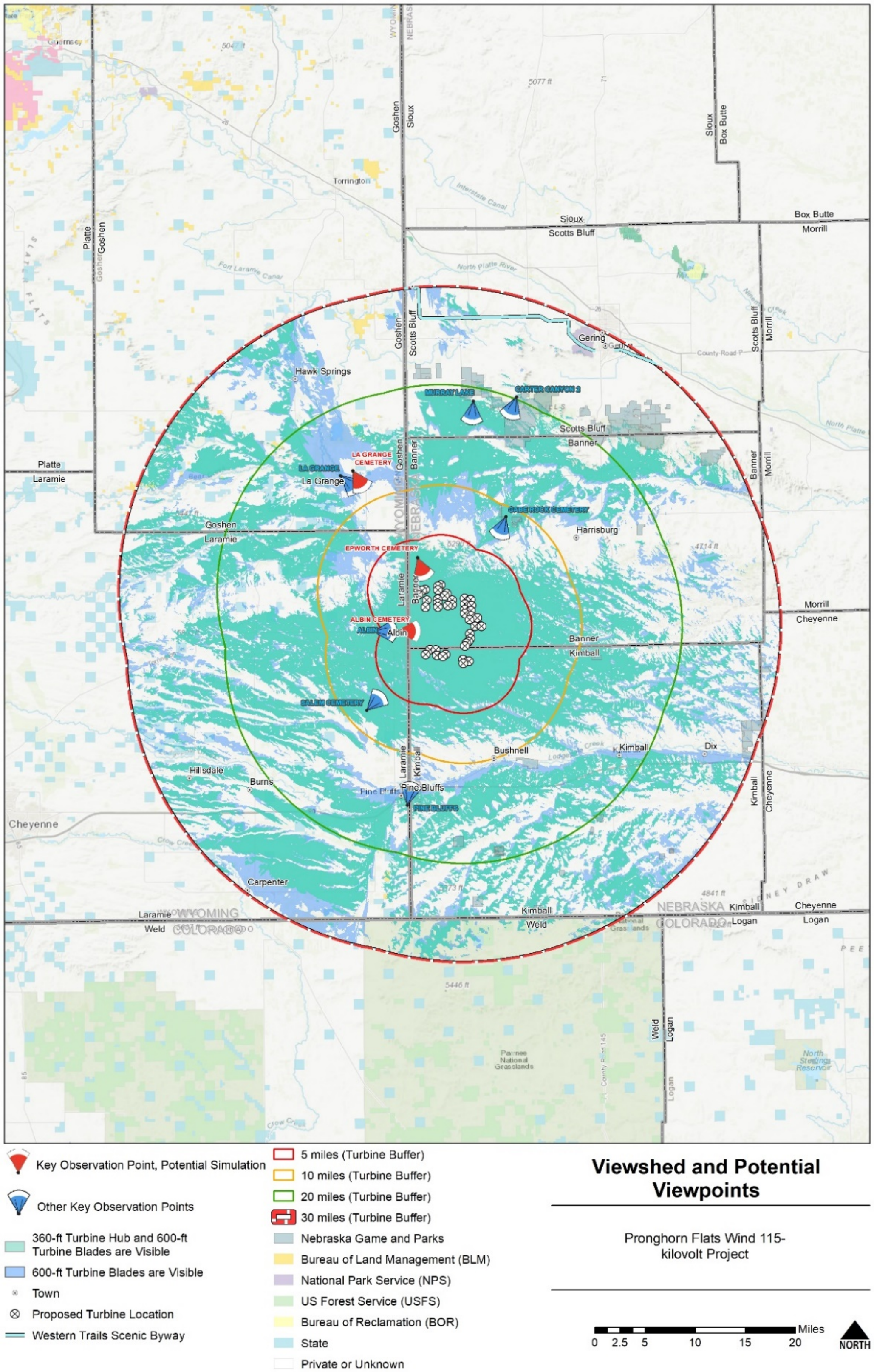

Figure 3-11. Visibility of the wind turbines at varying distances.

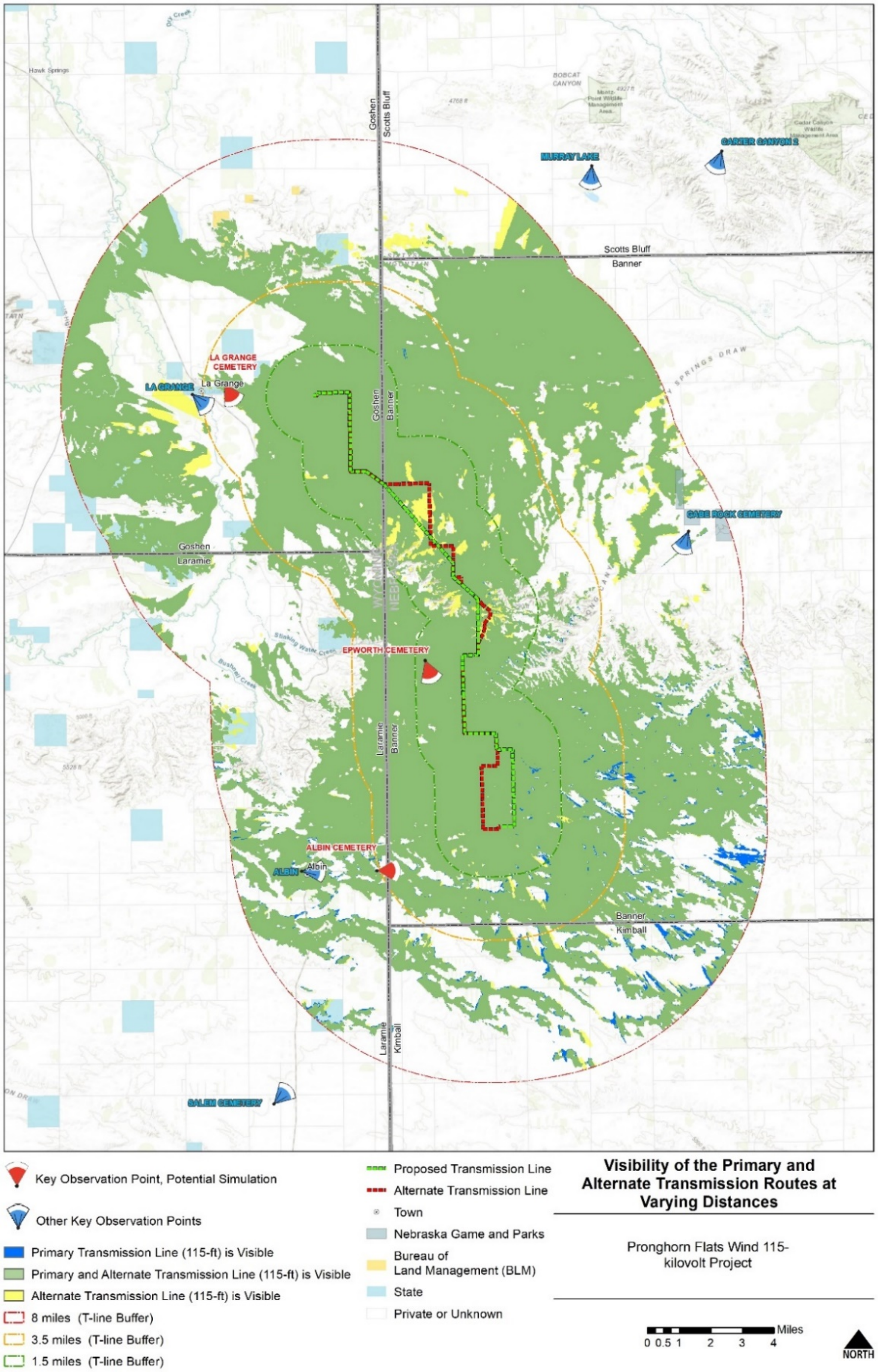

Figure 3-12. Visibility of the primary and alternative transmission routes at varying distances.

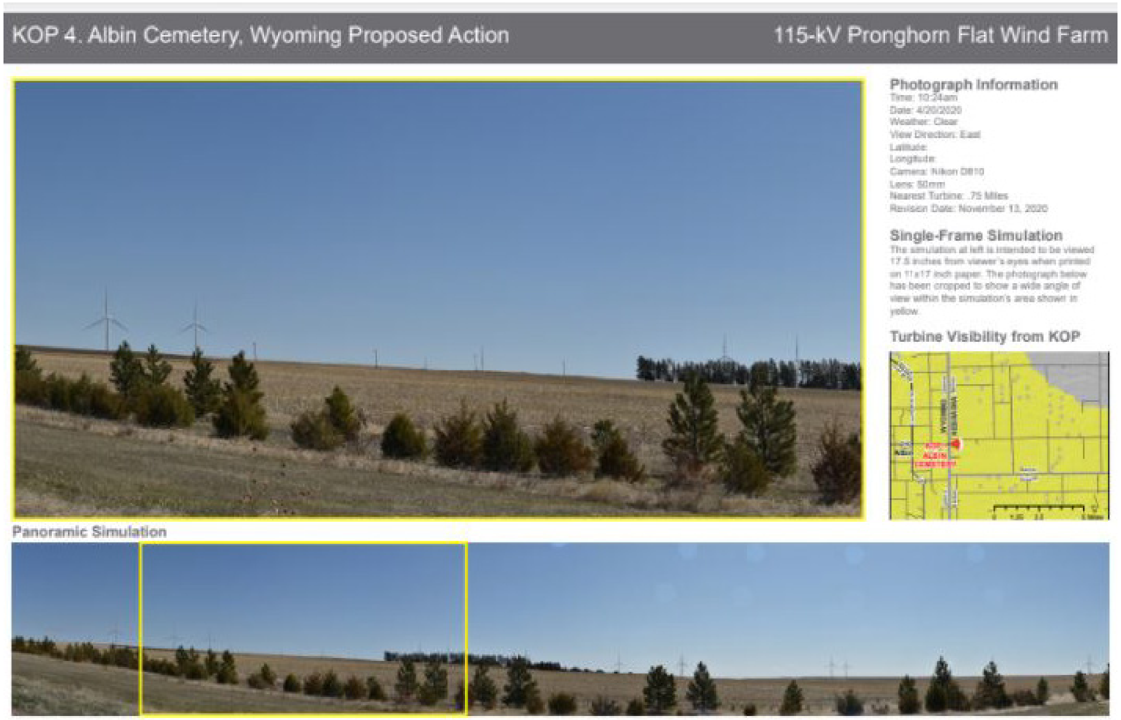

Figure 3-13. The Albin Cemetery key observation point to help visualize the impacts to the existing landscape, Wyoming.

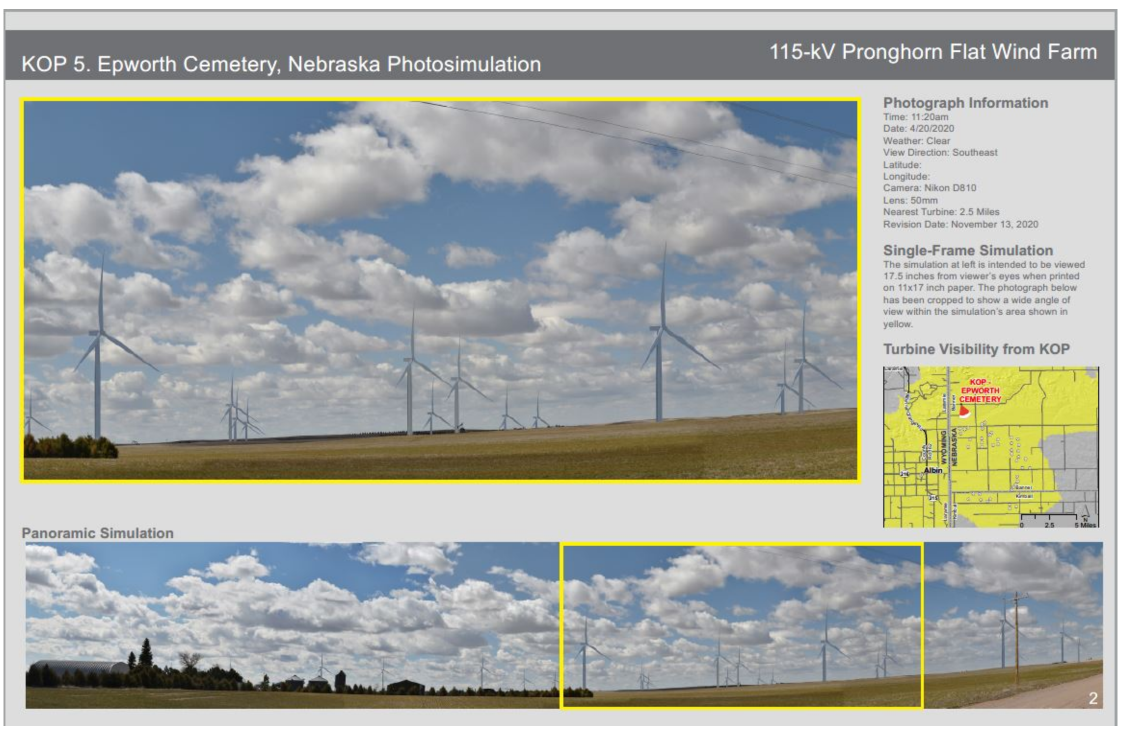

Figure 3-14. The Epworth cemetery key observation point to help visualize the impacts to the existing landscape, Nebraska

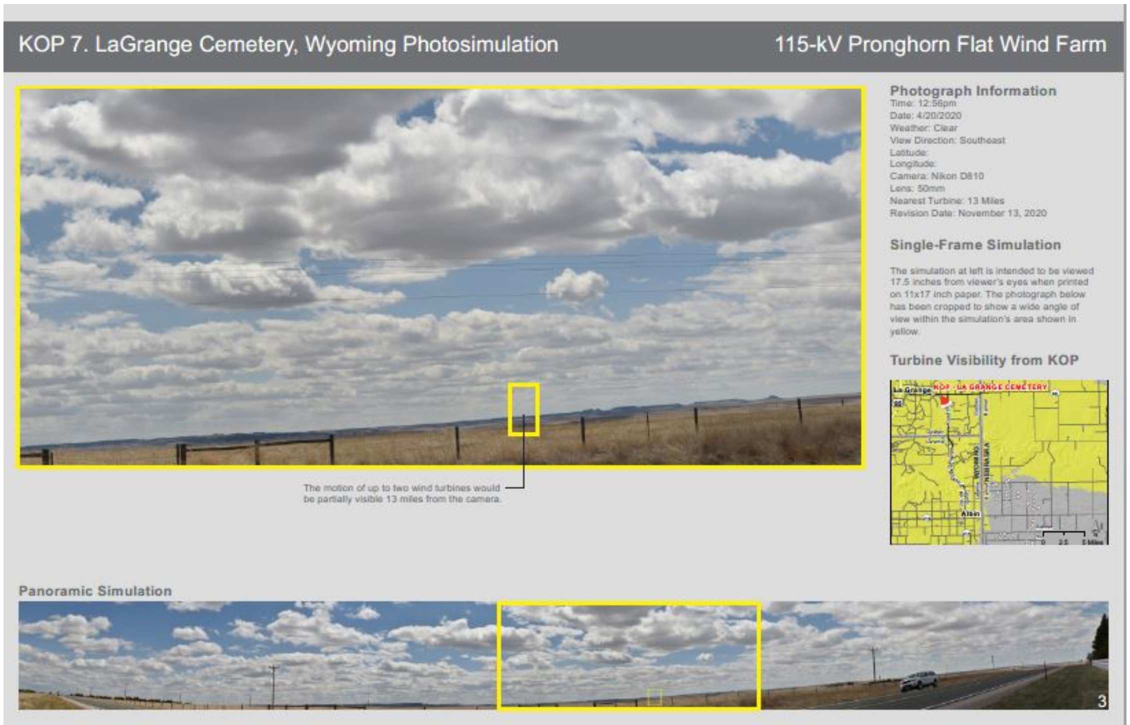

Figure 3-15. The LaGrange cemetery key observation point to help visualize the impacts to the existing landscape, Wyoming.

Shadow flicker is the effect of the sun (low on the horizon) shining through the rotating blades of a wind turbine, casting a moving shadow. It will be perceived as a "flicker" due to the rotating blades repeatedly casting the shadow. Although in many cases shadow flicker occurs only a few hours in a year, it can potentially create a nuisance for homeowners in close proximity to turbines. Computer models can accurately predict when, where, and to what degree this problem will occur, so wind project developers can mitigate this impact during the site selection process. In addition, many local ordinances incorporate language addressing shadow flicker to minimize any potential impact on neighbors (Office of Energy Efficiency and Renewable Energy 2020).

A shadow flicker analysis for the Project conducted by EAPC Wind Energy (Figure 3-16, Appendix E; Haley and Partner 2020) conservatively estimated Project-generated shadow flicker at 30 dwellings within 1.25 mi of a wind turbine associated with the Project. Modeling was based on the GE 3.03-140 turbine with a 322-ft hub height. The shadow flicker modeling results for all potential turbine locations indicate that for the 30 dwellings modeled, the highest amount of shadow flicker per year, would be approximately 28 hours and 15 minutes per year (5NP on Figure 3-16).

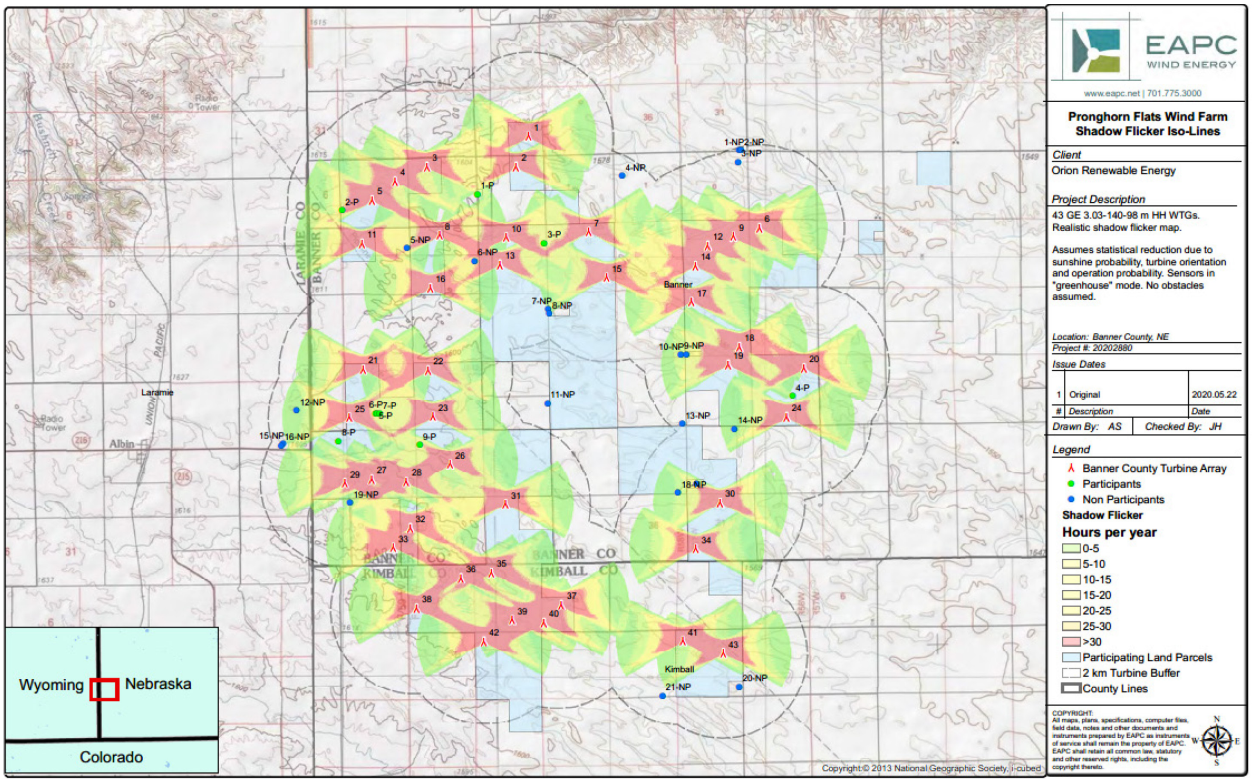

Figure 3-136. Results of the shadow flicker analysis for the Pronghorn Flats 115-kilovolt Project.

3.8.3 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed. Therefore, no specific Project-related changes to visual resources would occur within the analysis area. Furthermore, under the No-action Alternative, other visual resource impacts could occur because private landowners may choose to develop agricultural or undeveloped properties for more intensive land uses.

3.9 Cultural Resources

Centennial Archaeology conducted an intensive Class III cultural resource inventory in Banner and Kimball counties, Nebraska, and Goshen County, Wyoming, following the initial primary and alternative transmission line routes (Gensmer *et al.* 2020). The inventory was conducted for compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) due to WAPA's lead federal agency role in this Project. The area surveyed consists of linear corridors for the proposed access roads, cabling, and transmission lines, and block survey surrounding turbine locations, met towers, substation, and switchyard. An 85% sample survey of the area of potential effects (APE) was conducted. The surveyed area encompasses approximately 3,920 acres of land, including 3,623 acres in Nebraska and 297 acres in Wyoming. The fieldwork was conducted between July and August 2020. Approximately 3,370 acres of private property and 42.2 acres of state-owned land in Wyoming were subjected to systematic pedestrian survey. The transmission line route was altered since the surveys were conducted and approximately four mi of the adjusted transmission line route in Wyoming has not been surveyed.

In compliance with Section 106 of the NHPA, adverse effects from visual impacts from renewable resources must be considered for each historic property. The indirect visual APE was established prior to the initiation of Project work and was determined by WAPA through consultation with the SHPOs of Wyoming and Nebraska. In Nebraska, this area was defined as a buffer extending two mi from all Project elements as proposed. In Wyoming, the SHPO required a more complex buffer based on the individual project elements. For this Project, the required distances were 10 mi from the turbine locations, eight mi from the transmission line locale, and two mi from all other elements. However, given the proposed layout, the 10-mi buffer for the turbines exceeded the smaller buffers for the other elements and, since it extended the furthest, was the one used for this Project. The same buffer applies to both historic and archaeological resources. As a result of Class I literature searches in the area and in coordination with the Wyoming and Nebraska SHPO, a list of 15 historic sites with standing structures that were likely to be visually impacted by the Project undertaking was assembled (Table 3-18). These sites were included in a Visual Analysis performed by Centennial Archaeology.

Table 3-18. Sites included in the Visual Analysis.

State	Site Number	NRHP Status	Criteria	Integrity	Age	Description
NE	BN00-030	Needs Data	Not Stated	Not Stated	1900	Farmhouse
NE	BN00-031	Needs Data	Not Stated	Not Stated	1910	Abandoned Farmstead
NE	BN00-032	Eligible/Reconnaissance	A, C	Not Stated	1880	Log House
NE	BN00-033	Needs Data	Not Stated	Not Stated	1910	Epworth Church&Cemetery
NE	BN00-034	Needs Data	Not Stated	Not Stated	1900	Abandoned Farmstead
NE	BN00-036	Needs Data	Not Stated	Not Stated	1910	Barn
NE	BN00-083	Needs Data	Not Stated	Not Stated	1920	Abandoned Farmhouse
NE	BN00-084	Needs Data	Not Stated	Not Stated	1920	Farmstead
NE	BN00-085	Needs Data	Not Stated	Not Stated	1915	Abandoned Farmstead
NE	BN00-086	Needs Data	Not Stated	Not Stated	1915	Farmhouse
NE	KM00-046	Needs Data	Not Stated	Not Stated	1890	Abandoned Farmhouse
NE	KM00-052	Needs Data	Not Stated	Not Stated	1920	Farmstead
NE	KM00-053	Needs Data	Not Stated	Not Stated	1920	Farmstead
WY	GO42	Not Evaluated	Not Stated	Not Stated	Historic	Texas Trail Monument
WY	LA540	Not Evaluated	Not Stated	Not Stated	Historic	La Cavalier Homestead

NE = Nebraska; WY = Wyoming; NRHP = National Register of Historic Places.

3.9.1 Environmental Consequences—Proposed Action

This inventory resulted in the documentation of 39 sites and 13 isolated finds (Nebraska)/isolated resources (Wyoming). The Banner County portion of the Project contained 31 sites and 12 isolated finds, while eight sites are located in Kimball County, and one isolated resource was recorded in Goshen County. Of the sites, three are previously recorded, and 36 were newly recorded for this Project. The three previously recorded sites are all historic architectural properties. All newly recorded sites are archaeological resources, 10 of which are prehistoric in age, 21 are historic, and five contain both prehistoric and historic components. All but one of the isolated resources are prehistoric in age, while the remaining isolated resource is historic. The prehistoric sites and isolates consist of lithic scatters, open camps, and single lithic artifacts. One diagnostic projectile point resembling a Middle Archaic period McKean lanceolate style was recorded. A second projectile point midsection was too fragmentary to assign to a specific typology but, based on size and overall morphology, is tentatively identified as Archaic in age. The historic sites include abandoned homesteads, foundations, stock dams, rock inscriptions, debris scatters, and abandoned agricultural equipment. The historic sites all date to the late-19th through the mid-20th centuries. Centennial Archaeology recommends that six of them are eligible for National Register of Historic Places (NRHP) inclusion, and the remaining 33 sites are not eligible. None of the isolated resources are considered eligible (Gensmer *et al.* 2020).

Based on the results of this survey, future archaeological research should focus on studying the prehistoric land-use patterns, focusing on the occupation of the bluffs and canyons in the northern portion of the surveyed area. Subsurface excavations of archaeological sites should attempt to determine whether and where intact cultural horizons might exist below plow zones. Historic archaeological research should attempt to define the primary period of settlement and occupation of homesteads prior to abandonment, as well as examining economic changes on these properties over the course of the occupations.

3.9.1.1 Management Recommendations

Significance evaluations are presented on a site-by-site basis in the cultural survey report (Gensmer *et al.* 2020). No further work is recommended for the 33 sites and the 13 isolated resources determined by WAPA and the SHPOs as not eligible for the NRHP listing (WY 10/11/21:DBPR_WY-2021-937; NE 9/24/21: HP#2006-097-01). Of the six sites evaluated as eligible, four of these were considered eligible due to inferred research value. The six sites that are evaluated as eligible for NRHP listing are considered significant because these sites are believed to yield important information, or because access to the property was not granted and the potential for additional archaeological data could not be evaluated. Impacts to these sites should be avoided. Should avoidance of these sites not be possible, additional research is recommended within the specific footprint of anticipated impact areas for any future projects to assess the nature of potential subsurface components and evaluate integrity and research value. In the event that previously undocumented archaeological or historical materials are encountered during construction, all work should cease in the immediate area of the discovery, and the discovery locale should be protected until its NRHP significance can be assessed by a qualified archaeologist.

3.9.1.2 Visual Analysis

The purpose of this Visual Analysis was to determine the line-of-sight visibility of the wind turbines and their maximum blade height from an observer's perspective from the location of each of the sites listed in Table 3-18. At a height of 360 ft, at least one turbine is visible for 14 of the 15 cultural sites. 48GO42 was the sole site from which no turbines were visible. With the target heights representing the maximum blade height of 600 ft, at least one target was visible from all 15 observer locations. Figure 3-17 shows the results of the viewshed process for the turbine locations. The viewshed analysis was performed at both 360 ft and 600 ft from the turbine locations to represent the turbine height and the blade height, respectively. The resulting map graphic shows the extent of the area in which the turbines and blades are visible within the Class I study area. Both the turbines and blades are visible to a large portion of the southern half of the Class I study area due to the proximity and relatively flat topography. Figure 3-18 shows the viewshed analysis for the proposed transmission line route. This operation was performed on the transmission line centerline at a height of 115 ft.

3.9.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on cultural resources from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in the same type and level of impacts to cultural resources as they exist in 2020.

3.10 Land Use and Public Facilities

Agriculture, with few residences scattered throughout, is the primary land use in the vicinity of the Project. Within Banner County, Harrisburg is an unincorporated community that serves as the county seat and is located approximately 12 mi northeast of the Project. There are no incorporated municipalities in Banner County. While there is a public school located in Harrisburg, most community facilities and services near the Project are located in the towns of Scottsbluff and Gering, Nebraska, which are approximately 50 mi northeast of the Project, and Kimball, Nebraska, which is approximately 30 mi to the southeast. Scottsbluff, Gering, and Kimball contain medical, police, fire and ambulance services, schools, places of worship, and parks and recreational facilities. No community facilities are located within the analysis areas.

3.11 Public Lands

The analysis areas within Nebraska do not include any state or federal public lands. A NGPC statewide effort called “The Open Fields and Waters Program” focuses on finding hunter and angler access to private lands. Based on this program, the analysis areas do not contain any privately owned land leased for public hunting access (referred to as Public Access Atlas Areas). Additionally, there are no other types of public hunting areas in the analysis areas. Within Wyoming, state land falls within the analysis area but outside of the transmission line route (Figure 1-1).

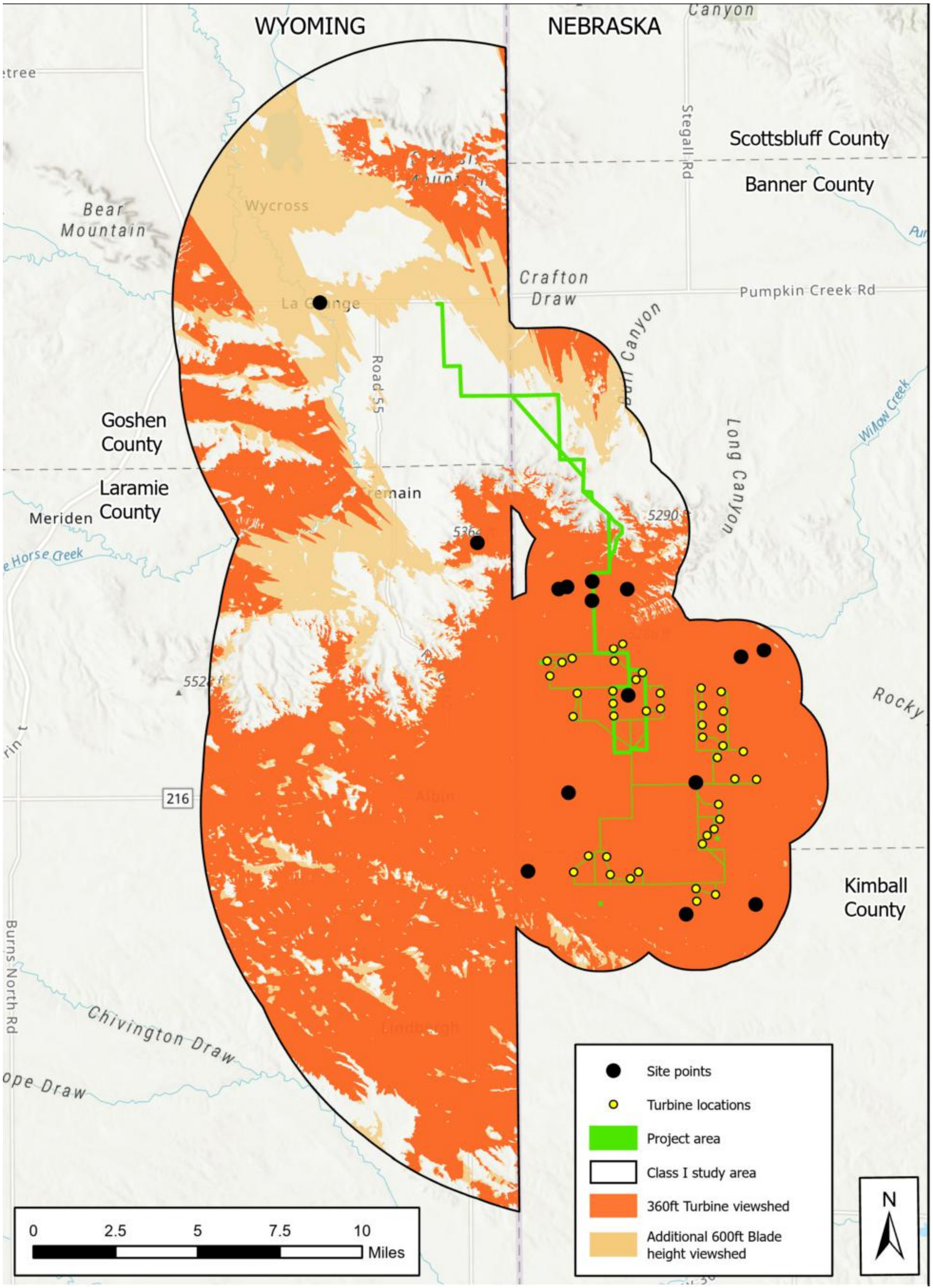

Figure 3-17. Viewshed map showing areas where proposed turbines and blades are visible within the Class I study area.

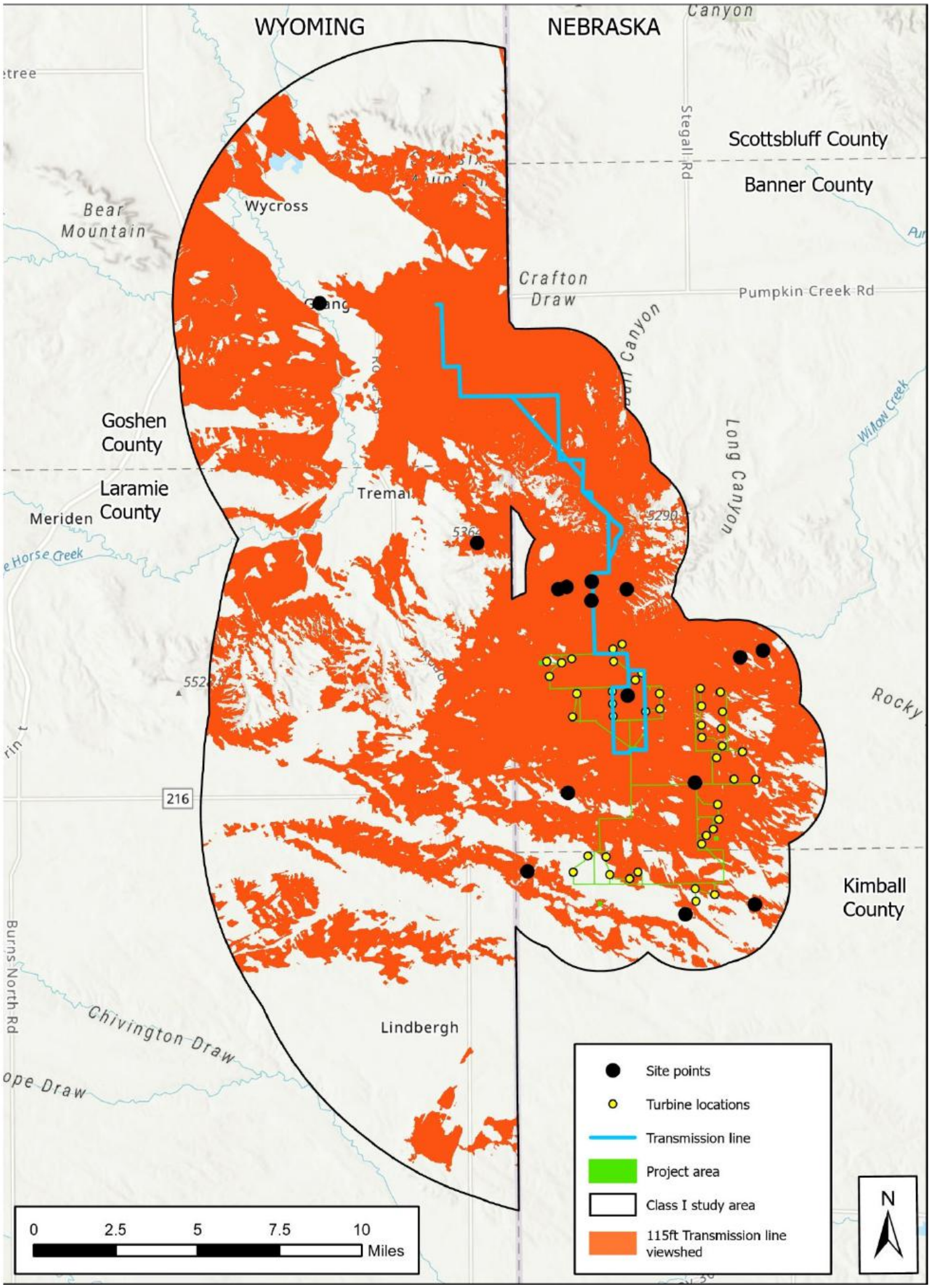

Figure 3-18. Viewshed map showing areas where the proposed transmission line is visible within the Class I Study area.

3.11.1 Environmental Consequences—Proposed Action

Based on the indicative layout of wind turbines, access roads, collector lines, and associated facilities, no residences or businesses would be displaced due to construction of the Project. Approximately 663 acres would be temporarily impacted by Project construction for up to 12 to 18 months. Following construction, approximately 93 acres would be used for long-term operations of the Project and approximately 570 acres would be returned to pre-construction land uses, which primarily consist of cultivated crops, herbaceous vegetation, and developed open space. There may be some improvements to gravel roads and temporary impacts to local roads during the construction phase of the Project, as required. Improvements could include adding gravel, widening, and repairing potholes. The Project will seek to obtain road haul agreements with Banner, Kimball, and Goshen counties and to minimize and mitigate the impacts to area transportation.

Project operation would have minimal long-term impacts on agricultural land. Agricultural activities could occur up to the edge of access roads and turbine pads. Access roads and turbine pads would not be fenced off, except for gates/cattle guards installed in landowner fences. Livestock and the landowners would be able to cross access roads and move about unimpeded. The buried underground collector system would not alter agricultural activities in the long term. Decommissioning impacts would be the same as those described for the construction phase.

3.11.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on public lands from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to result in the same type and level of impacts to the public lands as currently exists.

3.12 Transportation

The scope of the transportation analysis area includes the roads that access the Project and new and/or existing roads within the Project. The wind turbine site would be accessed from Banner CR-6, CR-14, and CR-15, by way of I-80 and SR-71, or other roads identified in the Transportation Plan. The Project would connect the turbine substation to the electric grid, with the point of interconnection located at a proposed WAPA switchyard. The switchyard is expected to be located near Wyoming State Hwy 151/NE, SR-88, and 2.5 mi west of CR-40. The substation would be located approximately 1.25 mi north of CR-6, adjacent to CR-9. The closest community is Harrisburg, Nebraska, approximately 12.00 mi northeast of the Project.

Based on the indicative layout, it is estimated that there would be approximately 38.7 mi of access roads, of which approximately 16.4 mi would be new roads and 22.2 mi would be existing roads. Table 3-19 provides a list of roads likely to be used by the Project, including surface type, width, and number of lanes.

Table 3-19. Access roads within the Pronghorn Flats 115-kilovolt Project.

Road	Surface Type[1]	Surface Width[2]	Total Lanes[3]
SR-71	Asphalt	48 feet	4
SR-88	Asphalt	24 feet	2
CR-6	Gravel, crushed rock	24 feet	2
CR-7	Gravel, crushed rock	24 feet	2
CR-9	Gravel, crushed rock	18 feet	2
CR-10	Gravel, crushed rock	18 feet	2
CR-12	Gravel, crushed rock	18 feet	2
CR-13	Gravel, crushed rock	18 feet	2
CR-14	Gravel, crushed rock	24 feet	2
CR-15	Gravel, crushed rock	24 feet	2
CR-18	Gravel, crushed rock	24 feet	2
CR-40	Gravel, crushed rock	24 feet	2
CR-54	Gravel, crushed rock	24 feet	2
CR-56	Gravel, crushed rock	18 feet	2
Road 244	Gravel, crushed rock	24 feet	2

[1] Surface type was determined using available aerial imagery.

[2] Surface width was determined through geographic information system measurement using available aerial imagery, assuming a lane width of 12 feet for rural and high-speed municipal roadways.

[3] Where the total number of lanes was not obvious from aerial imagery, the number of lanes was determined based on surface width estimate.

CR = County Road, SR = State Route.

Sources: Nebraska Department of Transportation 2016, U.S. Census Bureau 2019.

The AADT flow for many roads is available from the NEDOT. Available AADT data for roads within the analysis area is presented in Table 3-20.

Table 3-20. Access roads within the Pronghorn Flats 115-kilovolt Project.

Road	AADT (Number of Trips)
SR-71	2,920
South CR-88	280
North CR-88	670
CR-14/17 Mile Road	30

CR = County Road, SR = State Route; AADT = annual average daily traffic.

Sources: Nebraska Department of Transportation 2020a, 2020b.

No airports are located within the analysis area. The closest airports within Nebraska are the Robert E. Arraj Field, located approximately 20 mi to the southeast, and the Western Nebraska Regional Airport William B. Hellig Field, located approximately 33 mi to the northeast. The nearest military air installation is the F. E. Warren Air Force Base (AFB) in Cheyenne, Wyoming, located approximately 43 mi west of the Project. The nearest air military installation in Nebraska is the Offutt AFB, south of Belleview, located approximately 417 mi east of the Project. The nearest Air National Guard installation is the Wyoming Air National Guard in Cheyenne, located approximately 43 mi west of the Project. The closest Air National Guard installation in Nebraska is the 155th Air Refueling Wing, located approximately 381 mi east of the Project at the Lincoln Municipal Airport in Lincoln.

3.12.1 Environmental Consequences—Proposed Action

Under the Proposed Action, construction would occur over a nine- to 14-month period for the indicative layout of 43 turbines and other components. However, with the potential additional five turbines, the Project would increase in size and, therefore, the construction period may be extended, but still within the 14-month total. Potential impacts to existing road use during Project construction are expected to be minor due to current relatively low AADT counts on roads within the analysis area. Other vehicle traffic would likely remain similar to current levels during the construction period, but could experience a decrease if the construction activity deters other travelers. At times, materials and equipment transportation to and from the Project may impede existing road use. Materials required for construction would be delivered by a variety of trucks, trailers, or other vehicles capable of transporting large and heavy loads.

Construction of the Project would bring, on average, 10 heavy truck loads of materials per wind turbine. Approximately, an additional 50 vehicles trips would be required during the earliest phase of construction. Up to approximately 75 personal vehicle trips would occur each day, assuming two passengers per vehicle. The emissions from this activity would not exceed air quality standards.

Project construction would require the temporary storage of materials, equipment, and parking for worker and delivery vehicles. The need for expanded storage, and the activities associated with developing staging areas could contribute to temporary constraint along road corridors. Project use of existing ROWs would be coordinated with appropriate state, county, and local authorities.

Long-term impacts to local transportation are expected to be comparatively minor. Visitation levels to the Project for O&M would not change substantially once Project construction is completed. Where roads were not improved for construction of the Project, no long-term detriment to existing roads would be expected.

The turbines and transmission lines would be constructed and operated in accordance with FAA regulations. No impacts to air traffic would be anticipated from the Project.

3.12.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on roads or transportation from the Project. Existing traffic levels, patterns, and trends would likely continue. As land use in the area changes, so would the associated road use. Maintenance and repair of roads would occur based on existing plans.

3.13 Socioeconomics

The analysis area for socioeconomic impacts includes Banner and Kimball counties, Nebraska, and Goshen County, Wyoming. The closest community to the Project is Harrisburg, Nebraska, a census-designated community of approximately 65 residents, according to the 2018 American Community Survey 5-year estimates (U.S. Department of Commerce 2020).

The largest nearby communities to the Project include:

- Scottsbluff, Nebraska, located 50 mi northeast of the Project in Scotts Bluff County, with a population of 14,805
- Kimball, Nebraska, located 30 mil southeast of the Project in Kimball County, with a population of 2,762
- La Grange, Wyoming, 20 mi northwest of the Project in Goshen County, with a population of 361 (U.S. Department of Commerce 2020).

Between the years of 2010 and 2018, the population in Banner and Kimball counties dropped by 3.3% and 3.9%, respectively. However, the Nebraska state population grew at a rate of 5.9%. Similarly, the Wyoming state population grew by 6.6%; however, Goshen County grew at a rate of 4.6% during this same time period (U.S. Department of Commerce 2020).

The median age of residents in these three counties is approximately 46 years; Banner County has the highest median age of 48.5 years. The median age in these counties is older than in the states of Nebraska (36.4 years) and Wyoming (37.3 years), and the U.S. population (37.9 years). See additional information on race, ethnicity, and income level in Section 3.14 (Environmental Justice).

The following economic and financial statistics, unless otherwise noted, are provided by Headwater Economics' Economic Profile System (Headwaters Economics 2019), which uses published statistics from federal data sources, including the U.S. Department of Commerce and the U.S. Department of Labor, Bureau of Labor Statistics.

In 2018 in the analysis area, the three, industry sectors providing the largest number of jobs were government (1,994 jobs), farming/agricultural (1,557 jobs), and healthcare and social assistance (968 jobs; Figure 3-19). From 2001 to 2018, the three industry sectors that added most new jobs were government (224 new jobs), finance and insurance (156 new jobs), and transportation and warehousing (147 new jobs). From 2001 to 2018, jobs in service-related industries grew from 5,041 to 5,194 (a 3% increase) and government jobs grew by 13% (from 1,770 to 1,994). Employment in Banner County consists of 41.6% agricultural jobs, including livestock production. This is a significantly higher rate of agricultural employment than the other counties in the analysis area and the state average.

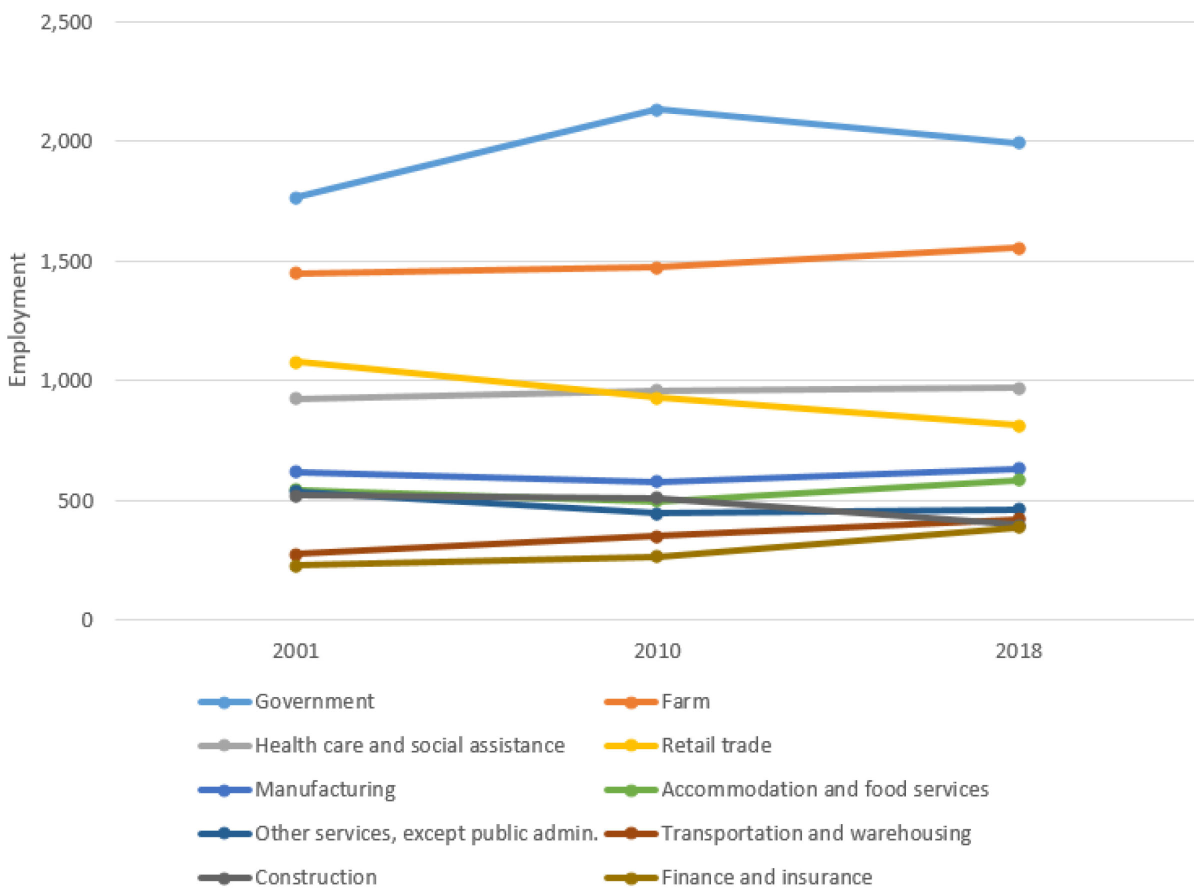

Figure 3-19. Employment by industry for the analysis area for the top 10 industries, 2001 to 2018.

Per capita incomes for the analysis area and reference geographies are presented in Table 3-21. Incomes in Banner County are higher than the state and U.S. averages. However, incomes in Kimball County, Nebraska, and Goshen County, Wyoming, are lower than the respective state averages. See additional information on poverty levels in Section 3.14 (Environmental Justice).

Unemployment is defined as the number of people who are jobless, looking for jobs, and available for work. The unemployment rate of residents across the analysis area is relatively consistent, with Kimball County having the lowest unemployment rate at 2.6% in 2018. For the three combined counties, unemployment peaked in 2009 during the Great Recession at just over 5% and has steadily dropped since to pre-recession levels.

Table 3-21. Income characteristics in the socioeconomic analysis area, 2018.

Income Characteristic	Goshen County, Wyoming	Banner County, Nebraska	Kimball County, Nebraska	Nebraska	Wyoming	US
Per capita income	$43,348	$58,252	$44,069	$53,263	$60,361	$54,446
Unemployment rate	3.3%	3.4%	2.6%	2.8%	4.1%	3.9%
Agricultural employment	12.7%	41.6%	15.9%	4.1%	3.6%	1.3%

Sources: U.S. Bureau of Economic Analysis (2019), U.S. Department of Commerce (2019), U.S. Bureau of Labor Statistics (2019a), as reported by Headwater Economics (2019).

3.13.1 Environmental Consequences—Proposed Action

Environmental commitments for air quality, noise, visual resources, and health and safety would apply to the analysis area. Specific socioeconomic environmental commitments are not identified for the Project.

The Project is expected to create both short-term and long-term beneficial impacts to the local and state economies. Short-term impacts to employment and socioeconomics would result from direct payments to landowners who host turbines, construction and maintenance activities, and eventually from decommissioning activities. Local businesses in nearby communities, such as restaurants, grocery stores, hotels, and fuel stations, would likely see increased business from construction-related workers. Local industrial businesses, including aggregate and concrete suppliers, welding and industrial suppliers, hardware stores, automotive and heavy equipment repair services, electric contractors, and maintenance providers, would also likely benefit from construction of the Project.

The Project would generate direct economic benefits for local landowners, local counties, and the states of Nebraska and Wyoming over the 30-year life of the Project. Wind lease payments to all landowners hosting wind turbines would be approximately $500,000 annually, on average. Nebraska has a centralized assessment method for wind turbines assessed by the Nebraska Department of Revenue, but proceeds are paid to the county treasurer where the facility is located. Additionally, counties assess the roads, turbine pads, and O&M buildings separately. Based on the nameplate capacity tax of $3,518/MW, the Project would have a Nebraska state assessment of approximately $404,570 per year if 115 MW are commissioned (https://nebraskalegislature.gov/laws/statutes.php?statute=77-6203). Additional benefits include county assessments, as well as local spending on O&M needs, such as automotive repair, tires, and fuel.

Construction of the Project would require skilled labor, such as foremen, ironworkers, electricians, and heavy equipment operators, as well as unskilled laborers. This diverse workforce would be needed to install the Project components, including wind turbines, access roads, underground collector lines, an O&M building, switchyard, 115-kV transmission line, and Project substation. More specialized jobs would likely be recruited from across the country, while laborers and truck drivers could be hired locally as temporary positions. The Project is expected to employ approximately 80 to 150 temporary workers over the 9- to 14-month construction period, and approximately four to six full-time employees for the life of the Project. The construction period would range from approximately 115,200 to 336,000 temporary full-time worker hours and 5,760 to 13,440 full-time worker hours for permanent positions annually, based on a 40-hour work week. The estimated number of construction jobs by classification and annual employment expenditures during construction are included in Table 3-22.

Table 3-22. Anticipated construction-related positions and employment expenditures.

Job Classification	Estimated Annual Salary
Electricians (47-2111)	$46,100
Truck drivers (53-3033, 53-3032)	$37,940–$45,890
Engineers (47-2073)	$39,410
Construction management (11-9021)	$112,180
Ironworkers (47-2221)[1]	$40,320
Laborers (47-2061)	$34,730
Turbine commissioning specialist (49-9081)[2]	$58,000

[1] Exact numbers are not available for regional data. State average is used.

[2] National average.

Source: U.S. Bureau of Labor Statistics 2019b.

After construction is complete and the Project is commissioned, the number of employees needed to operate and maintain Project components would be substantially less than required for construction (Table 3-23). Although many of the construction employees would likely come from outside the analysis area, long-term O&M employees may be, or become, local residents. Due to the relatively small size of the development, one of the O&M technicians would also be the Site and Health & Safety Manager.

Table 3-23. Anticipated operation-related positions and employment expenditures.

Job Classification	Estimated Annual Salary
Turbine Operation and Maintenance Technicians (49-9081)[1]	$58,000

[1.] National average.

Source: U.S. Bureau of Labor Statistics 2019b.

3.13.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on socioeconomic conditions from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue to contribute to local and state economies at a similar level.

3.14 Environmental Justice

The analysis area for environmental justice impacts includes Goshen County, Wyoming, and Banner County and Kimball County, Nebraska. Demographic data is collected by census tract;

however, Banner and Kimball counties, Nebraska, are included in only one census tract. Therefore, this analysis includes reporting for both Banner and Kimball counties. Census Tract 9580 (U.S. Department of Commerce 2020) is used for the analysis area in Goshen County, Wyoming. Tables 3-24 and 3-25 summarize minority and low-income population data in the analysis area and the reference geographies of Goshen County and the States of Wyoming and Nebraska, based on a 5-year estimate for 2014 to 2018 (U.S. Department of Commerce 2019, 2020).

Low-income populations are determined by the U.S. Census Bureau based upon poverty thresholds developed each year. Unlike minority populations, the CEQ does not provide specific criteria for assessing effects to low-income populations. The populations in the analysis area geographies are mostly white (between 97.6% and 95.1%) and not Hispanic (between 94.0 and 89.2 %). In the States of Wyoming and Nebraska, a slightly smaller proportion of the population was white (91.4% and 87.5%, respectively) and not Hispanic (90.2% and 89.3%, respectively).

Table 3-24. Minority populations (American Community Survey 5-Year Estimate, 2014 to 2018).

Location	Total Population	Percent Minority[1]	Percent Hispanic
Goshen County, Wyoming	13,438	6.9	10.6
Census Tract 9580	2,556	3.9	10.8
Banner County, Nebraska	696	2.4	6.0
Kimball County, Nebraska	3,667	4.9	10.7
State of Wyoming	581,836	8.6	9.8
State of Nebraska	1,904,760	12.5	10.7

[1] Minority data are calculated by adding the populations for all non-white races.

Sources: U.S. Department of Commerce 2019, 2020.

The analysis area geographies report between 9.5% and 12.1% of individuals below the poverty level (Table 3-25). In Wyoming, the percentage of residents below the poverty level overall poverty level (11.1%) is slightly lower than Goshen County (Census Tract 9580); however, in Nebraska, the percentage of residents below the poverty level (11.6%) is slightly higher than Kimball and Banner counties (U.S. Department of Commerce 2019, 2020).

Table 3-25. Low-income populations (American Community Survey 5-Year Estimate, 2014 to 2018).

Location	Total Population for whom Poverty Status is Determined[1]	Percentage of Residents Below the Poverty Level
Goshen County, Wyoming	12,849	11.6
Census Tract 9580	2,449	12.1
Banner County, Nebraska	694	9.7
Kimball County, Nebraska	3,608	9.5
State of Wyoming	567,950	11.1
State of Nebraska	1,850,245	11.6

[1] Poverty status is determined for all people except those institutionalized, in military group quarters, in college dormitories, and unrelated individuals less than 15 years old. The total population in the poverty table is slightly smaller than the overall population.

Sources: U.S. Department of Commerce 2019, 2020.

As indicated in Table 3-21 and 3-22, the percentages of minority and low-income residents in the analysis area do not exceed 50%, nor do they exceed county or state levels by greater than 20 percentage points. Therefore, according to CEQ guidance (1997), no environmental justice populations reside in the analysis area.

3.14.1 Environmental Consequences—Proposed Action

Environmental requirements and commitments for air quality, noise, visual resources, and health and safety would apply to the entire residential population in the vicinity of the Project, including any minority or low-income residents. Separate environmental justice environmental commitments are not identified.

No distinct minority or low-income populations have been identified in the analysis area; thus, no disproportionately high and adverse human health or environmental effects are expected from construction, O&M, or decommissioning of the Project.

3.14.2 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, there would be no direct or indirect impacts on environmental justice from the Project. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue. The trend toward conversion of undeveloped land to agriculture would likely continue, and these types of activities would not be expected to result in an environmental justice impact.

3.15 Health and Safety

The following sections describe electric and magnetic fields (EMFs) and physical hazards in the analysis area.

3.15.1 Electric and Magnetic Fields

Natural and man-made sources of EMFs are commonplace in the U.S. and exist within the analysis area. 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). Man-made sources include fossil fuel power plants, wind farms, substations, and power lines, as well as ordinary household appliances such as hairdryers, electric shavers, computers, wireless networks, cell phones, microwaves, and remote controls. The strength of an EMF decreases substantially with increasing distance from the source (National Institute of Environmental Health Sciences [NIEHS] 2018).

Potential health effects from EMF have been extensively studied (NIEHS 1999, World Health Organization 2007). The studies found a weak correlation between EMF exposure and a slightly increased risk of childhood leukemia. Studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer (NIEHS 2018).

There are currently no federal or state regulations on maximum EMF intensity. However, the International Commission on Non-ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronics Engineers (IEEE) have issued guidelines for exposure to EMF (ICNIRP 1998, IEEE 2002).

3.15.2 Physical Hazards

The analysis area is subject to physical safety hazards typical of a rural agricultural area, such as storms and vehicle accidents. In addition, wind turbines can present physical safety hazards including ice buildup on a blade that is then thrown off, and the potential of a rotor blade breaking and parts being thrown off. Blade throw historically has rarely occurred and ice throw occasionally occurs in the winter/spring months.

3.15.3 Environmental Consequences—Proposed Action

3.15.3.1 Electric and Magnetic Fields

EMFs can exist within substations and switchyards of the wind farm and along the 115-kV transmission line. The substation and switchyard locations would be located on private property and are not accessible to the general public; however, the public would have greater accessibility to 115-kV transmission line-related locations because some locations would be located on public ROWs or accessible for agricultural uses. The USEPA recommends limiting exposure to 0.5 milliGauss (mG) to 2.5 mG (USEPA 1992).

EMF levels decrease sharply with increasing distance. As Table 3-26 shows, the magnetic field of a sample 115-kV transmission line decreases by 97% (from 1.0 to 0.07-kV) at 100 ft away from the transmission line.

Table 3-26. Example EMF Levels with increasing distance from a power 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
115	1.0	0.07	0.01	0.003	29.7	1.7	0.4	0.2

EMF = electric and magnetic fields, kV = kilovolt, mG = milliGauss.

Source: Bonneville Power Administration 1994.

The nearest occupied residence/building to the centerline of the primary 115-kV transmission line route would be approximately 155 ft away; thus, the EMF exposure would be less than 1.0 mG at the closest residence, based on data extrapolated from Table 3-26.

3.15.3.2 Physical Hazards

As with any wind farm, the Project would present potential risks from natural disasters (e.g., earthquakes, storms), mechanical failure, human error, sabotage, cyber-attack, or deliberate destructive acts. The Project would not present unusual intrinsic system vulnerabilities or especially high potential for an event or threat. Thus, the proposed Project is not anticipated to be at an unusual risk for natural disasters, mechanical accidents, or acts of sabotage or terrorism during Project construction, O&M, or decommissioning.

Project wind turbines could potentially have a rotor blade break and be thrown from the turbine. Historically, blade breakage is a relatively rare event, and the probability of a fragment hitting a person is even lower (Hau 2000, Manwell *et al.* 2002). Current quality control standards for utility-scale wind turbine manufacture suggest that blade throw will continue to be a relatively rare occurrence.

Project wind turbines also could potentially throw ice from a rotating blade. Ice throw is a rare event because either ice pieces simply fall down off a blade or turbine control software triggers a turbine to stop rotating if ice buildup occurs. Contemporary turbine design limits the extent to which ice buildup can occur because as ice begins to form, blade balance would be altered, and monitoring devices would stop the blade rotation. Thus, ice throw also will likely continue to be a rare occurrence. To further lessen the potential for ice throw, wind farms establish a safety zone or setback from residences, roads, and other public access areas; such safety zones are often required by permitting agencies (Manwell *et al.* 2002). The suggested setback for the turbine model proposed for the Project, which will include turbine control software to control for ice throw, is 1.1 times tip height (GE Renewable Energy 2018).

Project construction and decommissioning activities would not generate risk from rotor blade break or ice throw because the turbine blades would not be moving.

3.15.4 Environmental Consequences—No-action Alternative

Under the No-action Alternative, WAPA would not provide an interconnection and it is assumed the Project would not be developed; therefore, no specific Project-related health or safety concerns would occur within the analyzed area. Ongoing land uses and existing activities (e.g., agricultural operations) would likely continue. The trend toward conversion of undeveloped land to agriculture would likely continue, and other health or safety impacts could occur because private landowners can choose to develop agricultural or undeveloped properties for more intensive land uses.

4.0 CUMULATIVE IMPACTS

Cumulative impacts are those that result from incremental impacts of a project when added to other past, present, and reasonably foreseeable future actions within the vicinity of a Proposed

Action. Cumulative impacts can result from individually minor, but collectively significant actions that take place over a period of time.

Past, present, and reasonably foreseeable future actions are considered in the general context of the Proposed Action for Kimball and Banner counties, Nebraska, and Goshen County, Wyoming. The area surrounding the Project is primarily under private ownership with scattered state lands. The past and present actions consist mostly of agricultural production. It is reasonable to assume these practices will continue into the future and maintain the current conditions. One existing wind project, the Kimball Wind Project, is located slightly north of Kimball, Nebraska, which is approximately 30 mi from the proposed Project. As for foreseeable future actions, there are two wind energy developments under consideration in the vicinity of the Project, including the Orion Energy 230-kV project and the Invenergy LLC project.

The proposed Orion 230-kV project is part of the Pronghorn Flats Wind Complex (Chapter 1.0). The 230-kV project would be developed in close proximity to the 115-kV project, but would pursue a different interconnection agreement with WAPA; thus, it would be evaluated in a subsequent NEPA process. The development of the 230-kV project would have additional temporary and long-term impacts similar to those described for the Proposed Action.

The Invenergy LLC project is projected to be a 500 MW project utilizing between 150 and 200 turbines located in Banner County, Nebraska. As of fall 2020, it is uncertain what transmission line this project would connect with to deliver the energy. If there is an interconnection with WAPA, the project would undergo a NEPA process. It is anticipated that many of the temporary and long-term impacts described for the 115-kV project would occur in the development and operation of the Invenergy LLC project.

The greatest impact to the public would likely be the visual impact from these three projects. Each of these projects would contribute an incremental shift from a rural landscape to one with vertical structures. However, due to the predominantly private property ownership of the area, the visual impacts would occur to scattered residents in the area and travelers on CRs and Hwys.

With the implementation of BMPs and Avoidance and Minimization Measures, the Proposed Action would avoid or minimize potential impacts and not measurably contribute to cumulative effects on resources from other past, present, and reasonably foreseeable future actions.

5.0 COORDINATION

5.1 Public Scoping

To engage potential stakeholders and request concerns regarding the proposed Project, WAPA and Orion have conducted two public scoping efforts by publishing announcements in the local papers, mailing letters to landowners and federal and state agencies, and posting notices on the WAPA website.

Comments from the public and agencies were submitted by mail, email and phone. Each comment was reviewed, considered, and responded to. A summary of comments is provided in Appendix F. All the comments helped define the scope and analysis presented in this EA.

5.2 Federal Agencies

The federal agencies that were contacted for the purpose of the EA scoping process are:

- F. E Warren AFB, Cheyenne, Wyoming
- U.S. DOE WAPA Rocky Mountain, Loveland, Colorado
- USFWS, Region 6, Ecological Services, Lakewood, Colorado
- USEPA, Office of Intergovernmental Affairs-Office of the Regional Administrator

5.3 State and Local Agencies

The state and local agencies that were contacted for the purpose of the EA scoping process are:

- Banner County Clerk's Office, Harrisburg, Nebraska
- Banner County Commissioner, Harrisburg, Nebraska
- Nebraska Department of Environment and Energy, Lincoln, Nebraska
- Nebraska Department of Natural Resources, Lincoln, Nebraska
- Nebraska SHPO, Lincoln, Nebraska
- NGPC, Lincoln, Nebraska
- Nebraska State Historical Society, Lincoln, Nebraska
- Office of Governor Mark Gordon, Cheyenne, Wyoming
- WGFD, Cheyenne, Wyoming
- Wyoming State Parks and Cultural Resources, Cheyenne, Wyoming
- Wyoming SHPO, Cheyenne, Wyoming

5.4 Native American Tribes and Associated Bodies

5.4.1 Tribal Consultation

As the lead federal agency under the NEPA and NHPA Section 106 review and per the agency's government-to-government consultation responsibility, WAPA contacted Native American tribes to identify locations of traditional or cultural importance within the Project vicinity of the proposed Project. None of the tribes expressed interest in consulting on the proposed project. On 9/30/21, the Pawnee Nation notified WAPA that "the proposed project/s should not affect the cultural landscape of the Pawnee Nation." Tribes that were contacted included:

- Shoshone-Bannock Tribes, Fort Hall Reservation and Cultural Resources/Heritage Tribal Office
- Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation
- Cheyenne River Sioux Tribal Council
- Santee Sioux Nation of Nebraska
- Yankton Sioux Tribe
- Crow Creek Sioux Tribe of the Crow Creek Reservation
- Crow Creek Reservation
- Oglala Sioux Tribal (OST) Council
- OST Cultural Affairs and Historic Preservation Office
- Lower Brule Sioux Tribe
- Sisseton-Wahpeton Oyate Tribes
- Rosebud Sioux Tribe
- Northern Arapaho Tribe
- Eastern Shoshone Tribe of the Wind River Reservation
- Cheyenne and Arapaho Tribes
- Pawnee Nation of Oklahoma

6.0 LIST OF PREPARERS

Name	Agency or Company	Title
Steven Blazek	Western Area Power Administration	NEPA Document Manager
Tim Langer	Western Area Power Administration	Biologist
Lisa Meyer	Western Area Power Administration	Archaeologist
Michael Kurnik	Orion Renewable Energy Group LLC	Director of Development
Gretchen Norman	WEST Inc.	NEPA Project Manager/Team Lead
Carmen Boyd	WEST Inc.	NEPA Specialist
Casi Lathan	WEST Inc.	NEPA Specialist
Erin Bibeau	Logan Simpson	Senior Associate- Project Manager
Kristi Gensmer	Centennial Archaeology	Project Manager/Principal Investigator

7.0 REFERENCES

7.1 Literature Cited

Anderson, W. L. 1978. Waterfowl Collisions with Power Lines at a Coal-Fired Power Plant. Wildlife Society Bulletin 6(2): 77-83.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D. C. and Sacramento, California. Available online: https://www.nrc.gov/docs/ML1224/ML12243A391.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

Baumgartner, E., C. Derby, and J. Fruhwirth. 2014. Site Characterization Study, Banner County, Nebraska, Wind Energy Area of Interest. Prepared by Western EcoSystems Technology, Inc. (WEST) Cheyenne, Wyoming.

Bay, K., K. Nasman, W. Erickson, K. Taylor, and K. Kosciuch. 2016. Predicting Eagle Fatalities at Wind Facilities. Journal of Wildlife Management 80(6): 1000-1010. doi: 10.1002/jwmg.21086.

Beaulaurier, D. L., B. W. James, P. A. Jackson, J. R. Meyer, and J. M. Lee. 1982. Mitigating the Incidence of Bird Collisions with Transmission Lines. Presented at the Third International Symposium on Environmental Concerns in Rights-of-Way Management, San Diego, California.

Bernardino, J., K. Bevanger, R. Barrientos, J. F. Dwyer, A. T. Marques, R. C. Martins, J. M. Shaw, J. P. Silva, and F. Moreira. 2018. Bird Collisions with Power Lines: State of the Art and Priority Areas for Research. Biological Conservation 222: 1-13. doi: 10.1016/j.biocon.2018.02.029.

Bevanger, K. 1994. Bird Interactions with Utility Structures: Collision and Electrocution, Causes and Mitigating Measures. Ibis 136(4): 412-425.

Bevanger, K. and H. Brøseth. 2001. Bird Collisions with Power Lines - an Experiment with Ptarmigan (*Logopus* Spp.). Biological Conservation 99: 341-346. doi: 10.1016/S0006-3207(00)00217-2.

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

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

Bureau of Land Management (BLM). 2008. Wind Energy Development Policy, Instruction Memorandum No. 2009-043, Director. Washington, D.C. December 19, 2008. Available online: http://windeis.anl.gov/documents/docs/IM_2009-043_BLMWindEnergyDevelopmentPolicy.pdf

Gensmer, K. A., K. Pelissero, M. A. Dinkel, E. M. Garner, C. C. Kinneer, and T. R. Bugg. 2020. A Class III Cultural Resource Inventory for the Pronghorn Flats 115kV Windfarm Progect in Banner and Kimball Counties, Nebraska, and Goshen County, Wyoming. Prepared for Western Area Power Administration on behalf of Orion and Western EcoSystems Technology, Inc. (WEST). Prepared by Centennial Archaeology.

Council on Environmental Quality (CEQ). 1997. Environmental Justice, Guidance under the National Environmental Policy Act. Accessed October 2014. Available online: https://www.epa.gov/environmentaljustice/environmental-justice-and-national-environmental-policy-act

Derby, C. 2006. Bird and Bat Fatality Monitoring of Six Un-Guyed, Unlit Cellular Telecommunication Towers within the Coconino and Prescott National Forests, Arizona: 2006 Season Results. Prepared for the American Tower Corporation, Mesa, Arizona, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 15, 2006.

eBird. 2020. eBird: An Online Database of Bird Distribution and Abundance. eBird, Cornell Lab of Ornithology, Ithaca, New York. Accessed April 2021. Available online: http://ebird.org/content/ebird/

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.

Epsilon Associates, Inc. 2019. Sound Level Assessment Report, Sweetland Wind Project, Hand County, South Dakota. Prepared for Scout Clean Energy.

Erickson, W. P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Annual Report: July 2001 - December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. December 2004. Available online: https://tethys.pnnl.gov/publications/stateline-wind-project-wildlife-monitoring-final-report-july-2001-december-2003

Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small Passerine Fatalities from Collisions with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi: 10.1371/journal.pone.0107491.

Executive Order (EO) 11988. 1977. Floodplain Management. President Carter. [42 Federal Register 26951, 3 Code of Federal Regulations (CFR), 1977 Comp., p. 117, unless otherwise noted.]. May 24, 1977. Available online: https://www.archives.gov/federal-register/codification/executive-order/11988.html

Faanes, C. A. 1987. Bird Behavior and Mortality in Relation to Power Lines in Prairie Habitats. General Technical Report 7. U.S. Fish and Wildlife Service (USFWS) Northern Prairie Wildlife Research Center, Jamestown, North Dakota. 24 pp.

Federal Aviation Administration (FAA). 2018. Obstruction Marking and Lighting. With Change 2. Advisory Circular AC 70/7460-1L. U.S. Department of Transportation, FAA. August 17, 2018. Available online: https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_70_7460-1L_-Obstuction_Marking_and_Lighting_-_Change_2.pdf

Federal Emergency Management Agency (FEMA). 2020. FEMA Flood Map Service Center. Accessed June 2021. Available online: https://msc.fema.gov/portal/home

Fleishman, E., J. Belnap, N. Cobb, C. A. F. Enquist, K. Ford, G. MacDonald, M. Pellant, T. Schoennagle, L. M. Schmit, M. Schwartz, S. van Drunick, A. L. Westerling, A. Keyser, and R. Lucas. 2013. Natural Ecosystems in Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment. A report by the Southwest Climate Alliance. G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, eds. Island Press, Washington D. C.

Fritchman, C. 2017. Banner County Area of Interest 2017 Raptor Nest Survey Results. Technical Memorandum. Prepared for Western Area Power Administration. Prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyoming.

Fritchman, C. 2020. Pronghorn Flats 2019 Aerial Eagle and Raptor Nest Survey Results. Technical Memorandum. Prepared for Western Area Power Administration. Prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyoming.

Fritchman, C. and K. Taylor. 2021. Avian Use Study, Pronghorn Flats Wind Energy Project, Banner County, Nebraska. Draft Report: April 2019 – May 2021. Prepared for Orion Wind Resources LLC, Oakland, California. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. November 30, 2021.

Geluso, K., J. J. Huebschman, and K. N. Geluso. 2013. Bats of the Wildcat Hills and Surrounding Areas in Western Nebraska. Monographs of the Western North American Naturalist 6(1): 20-42.

General Electric (GE) Renewable Energy. 2018. General Description, Setback Considerations for Wind Turbine Siting. Technical Documentation Wind Turbine Generator Systems, All Onshore Turbine Types. Provided to Sweetland Wind Farm, LLC.

Goshen County Weed and Pest Control District (GCWP). 2020. County Declared List. Goshen County Weed and Pest Control District, Torrington, Wyoming. Accessed July 2020. Available online: http://www.goshenweedandpest.com/county-declared-species.html

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

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.

Hamerlinck, J. D., T. B. Wyckoff, P. L. Polzer, and N. Cole. 2016. Wyoming Natural Resources and Energy Explorer. Presentation at the Wyoming Infrastructure Authority Conference. February 18, 2016.

Harness, R. E., S. Milodragovich, and J. Schomburg. 2003. Raptors and Power Line Collisions. Colorado Birds 37: 118-122.

Hau, E. 2000. Wind Turbines: Fundamentals, Technologies, Application, Economics. Springer-Verlag, Berlin, Germany.

Headwaters Economics. 2019. Populations at Risk. Headwaters Economics, Bozeman, Montana. Accessed March 2020. Available online: https://headwaterseconomics.org/tools/populations-at-risk/

Hester, S. G. and M. B. Grenier. 2005. A Conservation Plan for Bats in Wyoming. Wyoming Game and Fish Department (WGFD), Nongame Program, Lander, Wyoming.

Hoen, B. D., J. T. Rand, R. Wiser, J. Firestone, D. Elliot, G. Hubner, J. Pohl, R. Haac, K. Kaliski, M. Landis, and E. Lantz. 2018. National Survey of Attitudes of Wind Power Project Neighbors: Summary of Results. Berkeley Lab. January 2018. Available online: https://emp.lbl.gov/projects/wind-neighbor-survey

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.

Irby, L. R. 1981. Variation in Defecation Rates of Pronghorns Relative to Habitat and Activity Level. Journal of Range Management 34(4): 278-279.

Janss, G. F. E. 2000. Avian Mortality from Power Lines: A Morphological Approach of a Species-Specific Mortality. Biological Conservation 95: 353-359.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp. Available online: https://tethys.pnnl.gov/sites/default/files/publications/JohnsonBuffalo-2000.pdf

Johnson, G. D. 2004. A Review of Bat Impacts at Wind Farms in the US. Presented at the workshop in Washington, D.C., May 17-18, 2004. *In*: Wind Energy and Birds/Bats: Understanding and Resolving Bird and Bat Impacts. RESOLVE, Washington, D.C. Pp. 46-50.

Kimball County. 2010. Zoning and Subdivision Regulations. Kimball County, Nebraska. October 5, 2010. Amended April 3, 2012, May 21, 2013, November 19, 2013, July 1, 2014, May 2, 2017, April 17, 2018, and July 7, 2020. Available online: https://kimball.gworks.com/documents/2020%20Zoning%20Regs.pdf

Leddy, K. L., K. F. Higgins, and D. E. Naugle. 1999. Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program Grasslands. Wilson Bulletin 111(1): 100-104.

Lee, J. M., K. S. Pierce, C. A. Spiering, R. D. Stearns, and G. VanGinhoven. 1996. Electrical and Biological Effects of Transmission Lines: A Review. Bonneville Power Administration, Portland, Oregon.

Manwell, J. F., J. G. McGowan, and A. L. Rogers. 2002. Wind Energy Explained: Theory, Design, and Application. John Wiley & Sons, Ltd., Chichester, United Kingdom.

McCarthy, M. 2020. They're out of Control: Prairie Dogs Threatening Cheyenne County Towns, Commissioners Say. Star Hearld. July 6, 2020. Available online: https://starherald.com/townnews/zoology/they-re-out-of-control-prairie-dogs-threatening-cheyenne-county-towns-commissioners-say/article_4059ef08-7d6d-5044-bd8a-eaa9a0b51bb4.html

Mojica, E. K., B. D. Watts, J. T. Paul, S. T. Voss, and J. Pottie. 2009. Factors Contributing to Bald Eagle Electrocutions and Line Collisions on Aberdeen Proving Ground, Maryland. Journal of Raptor Research 43(1): 57-61. doi: 10.3356/JRR-07-60.1.

Mojica, E. K., C. E. Rocca, J. Luzenski, R. E. Harness, J. L. Cummings, J. Schievert, D. D. Austin, and M. A. Landon. 2020. Collision Avoidance by Wintering Bald Eagles Crossing a Transmission Line. Journal of Raptor Research 54(2): 147-153. doi: 10.3356/0892-1016-54.2.147.

Morkill, A. E. and S. H. Anderson. 1991. Effectiveness of Marking Powerlines to Reduce Sandhill Crane Collisions. Wildlife Society Bulletin 19(4): 442-449.

National Audubon Society (Audubon). 2019. Important Bird Areas. Accessed April 2021. Available online: https://www.audubon.org/important-bird-areas

National Insitute of Environmental Health Sciences (NIEHS). 1999. NIEHS Report on Health Effects from Exposure to Power Line Frequency and Electric and Magnetic Fields, Publication No. 99-4493. Prepared in Response to the 1992 Energy Policy Act (PL 102-486, Section 2118). Research Triangle Park, North Carolina. May 4, 1999. Available online: https://www.niehs.nih.gov/health/assets/docs_p_z/report_powerline_electric_mg_predates_508.pdf

National Insitute of Environmental Health Sciences (NIEHS). 2018. Electric & Magnetic Fields. NIEHS. Accessed October 31, 2018.

National Land Cover Database (NLCD). 2016. *As cited* includes:

Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

and

Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2016. Multi-Resolution Land Characteristics (MRLC) Consortium. U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Available online: https://www.mrlc.gov/data

National Oceanic and Atmospheric Administration (NOAA). 2006. Climate of Nebraska. NOAA, National Centers for Environmental Information. Accessed March 2020.

National Renewable Engery Laboratory (NREL). 2005. Nebraska – 50m Wind Power Map. WINDExchange, U.S. Department of Energy. Available online: https://windexchange.energy.gov/maps-data/81

Nebraska Department of Environmental Quality (NEDEQ). 2008. Faq's About Attainment & Nonattainment. NEDEQ, Lincoln, Nebraska. July 2008.

Nebraska Department of Transportation (NEDOT). 2016. Roadway Design Manual Chapter Six: The Typical Roadway Cross-Section. NEDOT, Lincoln, Nebraska. February 2016. Available online: https://dot.nebraska.gov/media/11483/i-chapter-6-cross-sections.pdf

Nebraska Department of Transportation (NEDOT). 2020a. Annual Average Daily Traffic Counts - 2020. GIS data files. NEDOT, Lincoln, Nebraska. March 2020.

Nebraska Department of Transportation (NEDOT). 2020b. Annual Average Daily Traffic Flow - 2018. NEDOT, Lincoln, Nebraska. Accessed March 27, 2020. Available online: https://gis.ne.gov/portal/apps/webappviewer/index.html?id=bb00781d6653474d945d51f49e1e7c34

Nebraska Game and Parks Commission (NGPC). 2018. Mccown's Longspur (*Rhynchophanes mccownii*) Proposed as Threatened in Nebraska. Prepared by NGPC, Lincoln, Nebraska. April 23, 2018. Available online: http://outdoornebraska.gov/wp-content/uploads/2018/04/McCownsLongspur_Summary_23Apr2018.pdf

Nebraska Game and Parks Commission (NGPC). 2019. Wetland Program Plan for Nebraska. NGPC, Lincoln, Nebraska. February 15, 2019. Available online: https://www.epa.gov/sites/production/files/2019-03/documents/final_wetland_program_plan_nebraska_2019.pdf

Nebraska Game and Parks Commission (NGPC). 2020a. Conservation and Environmental Review Tool (CERT). NGPC, Lincoln, Nebraska. Accessed August 2020. Available online: http://outdoornebraska.gov/environmentalreview/

Nebraska Game and Parks Commission (NGPC). 2020b. Swift Fox (*Vulpes velox*). NGPC, Lincoln, Nebraska. Accessed August 2020. Available online: http://outdoornebraska.gov/swiftfox/

Nebraska Game and Parks Commission (NGPC). 2020c. Threatened and Endangered Species. NGPC, Lincoln, Nebraska. Accessed August 2020. Available online: http://outdoornebraska.gov/endangeredspecies/

Nebraska Game and Parks Commission (NGPC). 2021. Pronghorn Flats Wind Project; Garden County, Nebraska. Technical Assistance Letter. To Orion Wind Resources LLC. From NGPC, Lincoln, Nebraska. Februrary 2, 2021

Nebraska Game and Parks Commission (NGPC) and Nebraska Natural Heritage Program (NNHP). 2017. List of Species by County. Current Range of Threatened and Endangered Species. Accessed May 2019. Available online: http://outdoornebraska.gov/wp-content/uploads/2018/05/T-and-E-Species-by-County-2017-December-2.pdf

Nebraska Invasive Species Program. 2020. Plants: Shortgrass Prairie. University of Nebraska, Lincoln, Nebraska. Accessed July 2020. Available online: http://neinvasives.com/ecoregions/shortgrass-prairie

Nebraska Natural Heritage Program (NNHP). 2011. Estimated Current Range of Mountain Plover (*Charadrius montanus*). Map produced by the NNHP, Nebraska Game and Parks Commission (NGPC). May 2011. Available online: http://outdoornebraska.gov/wp-content/uploads/2015/09/NHP_RangeMap_MountainPlover.pdf

Nebraska Natural Heritage Program (NNHP). 2019. Estimated Current Range of Western Prairie Fringed Orchid (*Platanthera praeclara*). Map produced by the NNHP, Nebraska Game and Parks Commission (NGPC). June 2019. Available online: http://outdoornebraska.gov/wp-content/uploads/2021/08/Western-Prairie-Fringed-Orchid.pdf

Nebraska Weed Control Association. 2020. Nebraska Noxious Weeds. Accessed July 2020. Availbale online: http://www.neweed.org/Weeds.aspx

New, L., J. Simonis, M. Otto, E. Bjerre, and B. Millsap. 2018. U.S. Fish and Wildlife Service Prior Analysis (Version 2). October 17, 2018. 9 pp. Available online: https://www.fws.gov/migratorybirds/pdf/management/crmpriorsreport2018.pdf

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Office of Energy Efficiency & Renewable Energy. 2020. Wind Energy Projects and Shadow Flicker. WINDExchange, U.S. Department of Energy. Available online: https://windexchange.energy.gov/projects/shadow-flicker

Olendorff, R. R. and R. N. Lehman. 1986. Raptor Collisions with Utility Lines: An Analysis Using Subjective Field Observations. Final report. Pacific Gas and Electric Company, Research and Development, San Ramon, California.

Omernik, J. M. 1987. Ecoregions of the Conterminous United States. Annals of the Association of American Geographers 77(1): 118-125.

Panella, M. J. and J. G. Jorgensen. 2018. Listing Proposal for Mccown's Longspur (*Rhynchophanes mccownii*) in Nebraska. Prepared by Nebraska Game and Parks Commission, Lincoln, Nebraska. April 2018. Available online: http://outdoornebraska.gov/wp-content/uploads/2018/04/McCownsLongspur_ListingProposal.pdf

Piorkowski, M. D. 2006. Breeding Bird Habitat Use and Turbine Collisions of Birds and Bats Located at a Wind Farm in Oklahoma Mixed-Grass Prairie. Thesis. Oklahoma State University, Stillwater, Oklahoma.

Platte River Recovery Implementation Program (PRRIP). 2006. Platte River Recovery Implementation Program Components. In partnership with Wyoming, Nebraska, Colorado, and U.S. Department of the Interior. October 24, 2006. Accessed February 2022. Available online: https://platteriverprogram.org/about/program-components

Reed, D. F. 1981. Conflicts with Civilization. Pp. pp 509-535. *In*: O. C. Wallmo, ed. Mule and Black-Tailed Deer of North America. Univeristy of Nebraska Press, Lincoln, Nebraska.

Rollan, A., J. Real, R. Bosch, A. Tinto, and A. Hernandez-Matias. 2010. Modeling the Risk of Collision with Power Lines in Bonelli's Eagle (*Hieraaetus Fasciatus*) and Its Conservation Implications. Bird Conservation International 20: 279-294.

RSG, Inc. (RSG). 2020. Pronghorn Flats Wind Farm Sound Modeling. Report. Prepared for Orion Wind Resources LLC. Prepared by RSG, White River Junction, Vermont. June 10, 2020.

Schneider, R., M. Humpert, K. Stoner, and G. Steinauer. 2005. The Nebraska Natural Legacy Project. (NNLP). A Comprehensive Wildlife Conservation Strategy. Nebraska Game and Parks Commission (NGPC) Publications. Paper 25. NGPC, Lincoln, Nebraska. Available online at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1024&context=nebgamepubs

Schneider, R., M. Fritz, J. Jorgensen, S. Schainost, R. Simpson, G. Steinauer, and C. Rothe-Groleau. 2018. Revision of the Tier 1 and 2 Lists of Species of Greatest Conservation Need: A Supplement to the Nebraska Natural Legacy Project State Wildlife Action Plan. Nebraska Game and Parks Commission, Lincoln, Nebraska. Available online: http://outdoornebraska.gov/wp-content/uploads/2018/11/NE-SWAP-SGCN-Revision-Supplemental-Document-2018-Final_edited-1.pdf

Shaffer, J. A. and D. H. Johnson. 2009. Displacement Effects of Wind Developments on Grassland Birds in the Northern Great Plains. Presented at the National Wind Coordinating Collaborative (NWCC) Wildlife and Wind Research Meeting VII, October 28-29, 2008, Milwaukee, Wisconsin. Pre-Conference Session, October 27, 2008. Prepared for the NWCC by S.S. Schwartz. Published June 2009.

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.

Silcock, W. R. and J. G. Jorgensen. 2020. Mountain Plover (*Charadrius montanus*). *In:* Birds of Nebraska Online. Accessed October 2020. Available online: https://birds.outdoornebraska.gov/mountain-plover/

Silcock, W. R. and J. G. Jorgensen. 2021a. Lark Bunting (*Calamospiza melanocorys*). *In:* Birds of Nebraska Online. Available online: www.BirdsofNebraska.org

Silcock, W. R. and J. G. Jorgensen. 2021b. Whooping Crane (*Gus Americana*). *In:* Birds of Nebraska Online. Available online: www.BirdsofNebraska.org

Snyder, L. and B. Bly. 2009. Differential Use of Agricultural Fields and Rangeland Nesting Habitat by Mccown's Longspur (*Calcarius mccownii*) and Chestnut-Collared Longspur (*Calcarius ornatus*) in Western Nebraska. Nebraska Bird Review 77: 35-41.

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.

University of Nebraska. 2016. Bat Assessment Guidance for Wind Energy Facilities in Nebraska. Nebraska Wind Energy and Wildlife Project, Univeristy of Nebraska, Lincoln, Nebraska. Accessed March 2020. Available online: https://wind-energy-wildlife.unl.edu/bat-assessment-guidance-wind-energy-facilities-nebraska

U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA). 2020. The Navigable Waters Protection Rule: Definition of ''Waters of the United States''; Final Rule. Department of the Army, Corps of Engineers, Department of Defense; and Environmental Protection Agency. 85 Federal Register (FR) 77: 22250-22342. April 21, 2020.

U.S. Bureau of Economic Analysis. 2019. Regional Economic Accounts. Accessed 2019. Available online: https://www.bea.gov/data/economic-accounts/regional

U.S. Bureau of Labor and Statistics. 2019a. Local Area Unemployment Statistics. U.S. Department of Labor, Washington D. C. Accessed 2019. Available online: https://www.bls.gov/lau/

U.S. Bureau of Labor and Statistics. 2019b. May 2019 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates; Northwest Nebraska Nonmetropolitan Area. Accessed May 14, 2020. Available online: https://www.bls.gov/oes/current/oes_3100001.htm

U.S. Census Bureau (USCB). 2019. Geographies: Tiger/Line Shapefiles. (Machine readable data files). Prepared by USCB, Suitland, Maryland. Released August 9, 2019. Accessed August 2021. Available online: https://www.census.gov/geo/maps-data/data/tiger-line.html

U.S. Department of Agriculture (USDA). 2017. Imagery Programs - National Agriculture Imagery Program (NAIP). USDA, Farm Service Agency (FSA), Aerial Photography Field Office (APFO), Salt Lake City, Utah. Accessed July 2020. Available online: https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. USDA Handbook 296. Issued 2006. Available online: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050898.pdf

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2017. RCPP: Regional Conservation Partnership Program. Grassland Bird Initiative. USDA NRCS. Available online: http://nebraskapf.com/wp-content/uploads/2017/01/GraslandBirdRCPPfactsheet.pdf

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2019. SSURGO Soils Data. Soil Survey Geographic (SSURGO) Database, Web Soil Data, NRCS USDA Soil Survey Staff, Washington, D.C. Updated July 31, 2019. Accessed August 2021. Available online: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053631

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2020. Soils: Soil Orders Map of the United States. USDA NRCS. Accessed May 2021. Available online: https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/class/maps/

U.S. Department of Commerce. 2019. Census Bureau, American Community Survey Office, Washington, D.C. As reported by Headerwaters Economics' Population Risk. Available online: https://headwaterseconomics.org/tools/populations-at-risk/

U.S. Department of Commerce. 2020. 2018: ACS 5-Year Estimates Data Profiles. Accessed April 8, 2020. Available online: https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2018/

U.S. Energy Information Administration (USEIA). 2020. State Electricity Profiles, Nebraska Electricity Profile 2018. U.S. Department of Energy, Washington, D.C. Accessed May 4, 2020. Available online: https://www.eia.gov/electricity/state/nebraska/

U.S. Environmental Protection Agency (USEPA). 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

U.S. Environmental Protection Agency (USEPA). 2000. Level IV Ecoregions of Kansas and Nebraska (Map). USEPA.

U.S. Environmental Protection Agency (USEPA). 2016. NAAQS Table. Available online: https://nwww.epa.gov/ criteria-air-pollutants/naaqs-table

U.S. Environmental Protection Agency (USEPA). 2018. Sources of Greenhouse Gas Emissions. Greenhouse Gas Emissions. Accessed March 30, 2020. Available online: https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

U.S. Environmental Protection Agency (USEPA). 2019. Emission Factors – Fugitive Dust Sources. USEPA. Available online: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s02.pdf

U.S. Environmental Protection Agency (USEPA). 2020a. AirData Air Quality Monitors. Interactive Online Map. USEPA. Accessed March 30, 2020. Available online: https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=5f239fd3e72f424f98ef3d5def547eb5&extent=-146.2334,13.1913,-46.3896,56.5319

U.S. Environmental Protection Agency (USEPA). 2020b. Status of Nebraska Designated Areas. Nebraska Areas by NAAQS. USEPA, Air Quality Implementation Plans. Accessed March 19, 2020. Available online: https://www3.epa.gov/airquality/urbanair/sipstatus/reports/ne_areabypoll.html

U.S. Environmental Protection Agency (USEPA). 2020c. Wyoming Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. USEPA, Green Book. Accessed April 2, 2020. Available online: https://www3.epa.gov/airquality/greenbook/anayo_wy.html

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. December 2008. USFWS Division of Migratory Bird Management, Arlington, Virginia. Available online: https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

U.S. Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

U.S. Fish and Wildlife Service (USFWS). 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. 103 pp. + frontmatter. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

U.S. Fish and Wildlife Service (USFWS). 2020. Updated Eagle Nest Survey Protocol. 4 pp. *Attachment to:* U.S. Fish and Wildlife Service (USFWS). 2020. Eagle Surveys. Memorandum to Regional Directors, Regions 1-12. From J. Ford, Assistant Director for Migratory Birds. USFWS, Washington, D.C. April 21, 2020. Available online: https://www.fws.gov/migratorybirds/pdf/management/EagleNest SurveyGuidanceUpdated.pdf

U.S. Fish and Wildlife Service (USFWS). 2022. Initial Project Scoping: IPaC - Information for Planning and Consultation. IPaC, Environmental Conservation Online System (ECOS), USFWS. Accessed February 2022. Available online: http://ecos.fws.gov/ipac/

U.S. Fish and Wildlife Service (USFWS). 2021b. U.S. Fish and Wildlife Service (USFWS), Region 6 Wildlife Buffer Recommendations for Wind Energy Projects. Version 3. USFWS, Region 6-, Mointain-Prairie Region. March 31, 2021. Available online: https://www.fws.gov/mountain-prairie/migbirds/library/USFWS%20R6%20Buffer%20Recommendations%20for%20wind%20energy%20projects_ver3.pdf

U.S. Geological Survey (USGS). 2019. National Hydrography Dataset (NHD). USGS NHD Extracts. August 8, 2019. Accessed October 2021. Available online: https://www.usgs.gov/core-science-systems/ngp/national-hydrography

U.S. Geological Survey (USGS). 2020a. Earthquake Hazards Program. Available online: https://earthquake. usgs.gov/

U.S. Geological Survey (USGS). 2020b, 2021. USGS Topographic Maps. Accessed June and October 2021. Available online: https://nationalmap.gov/ustopo/index.html

U.S. Geological Survey (USGS) Gap Analysis Project (GAP). 2018. Protected Areas Database of the United States (PAD-US). Version 2.0. USGS data release. September 30, 2018. Accessed June 2021. doi: 10.5066/P955KPLE. Available online: https://www.sciencebase.gov/catalog/item/5b030c7ae4b0da30c1c1d6de

USA.com. 2020. Banner County Weather. Accessed March 2020. Available online: http://www.usa.com/banner-county-ne-weather.htm

Welsch, M. 2020. Technical Memorandum: Aquatic Resource Inventory. Prepared for Western Area Power Administration. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. November 5, 2020.

Western Area Power Administration (WAPA) and U.S. Fish and Wildife Service (USFWS). 2015. Upper Great Plains Wind Energy Programmatic Environmental Impact Statement. DOE/EIS-0408. WAPA and USFWS. Available online: https://www.wapa.gov/regions/UGP/Environment/Pages/ProgrammaticWindEIS.aspx

Western Area Power Administration (WAPA). 2019. Sweetland Wind Farm Project. Draft Environmental Assessment. Hand County, South Dakota. DOE/EA-2095. WAPA, Lakewood Colorado. November 2019. Available online: https://www.wapa.gov/regions/UGP/environment/Pages/SweetlandWind.aspx

Western EcoSystems Technology, Inc. (WEST). 2021. Regional Summaries of Wildlife Fatalities at Wind Facilities in the United States and Canada. 2020 Report from the Renew Database. WEST, Cheyenne, Wyoming. June 30, 2021.

Willard, D. E. 1978. The Impact of Transmission Lines on Birds (and Vice Versa). M. L. Avery, ed. Proceedings on Impacts of Transmission Lines on Birds in Flight. FWS/OBS-78/48.

World Health Organization (WHO). 2007. Extremely Low Frequency Fields, Environmental Health Criteria 238. WHO Press, Geneva, Switzerland.

Wyoming Department of Environmental Quality (WYDEQ). 2015. Air Quality Network Assessment. WYDEQ, Air Quality Division, Cheyenne, Wyoming. October 20, 2015.

Wyoming Game and Fish Department (WGFD). 2017. State Wildlife Action Plan. WGFD, Cheyenne, Wyoming. Available online: https://wgfd.wyo.gov/Habitat/Habitat-Plans/Wyoming-State-Wildlife-Action-Plan

Wyoming Game and Fish Department (WGFD). 2020. Scoping Letter for an Environmental Assessment for the Proposed Pronghorn Flats Wind 115-Kv Project, Goshen County. Letter to S. Blazek, Western Area Power Administration (WAPA), Lakewood Colorado, from Department of Energy, WGFD, Cheyenne, Wyoming. June 26, 2020.

Wyoming Natural Diversity Database (WYNDD). 2020. Data Explorer. WYNDD, University of Wyoming, Laramie, Wyoming. Accessed August 2020. Available online: https://wyndd.org/data_explorer

Wyoming Natural Diversity Database (WYNDD). 2021. Wyoming Field Guide. Thick-billed Longspur - *Rhynchophanes mccownii*. University of Wyoming and Wyoming Game and Fish Department. Accessed June 17, 2021. Available online: https://fieldguide.wyndd.org/?species=rhynchophanes%20mccownii

Wyoming Weed and Pest Council. 2020. State Designated Noxious Weeds. Accessed July 2020. Available online: https://wyoweed.org/noxious-species/listed-species/state-designated-noxious-weeds/

Young, D. P., Jr., W. P. Erickson, R. E. Good, M. D. Strickland, and G. D. Johnson. 2003. Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, Final Report, November 1998 - June 2002. Prepared for Pacificorp, Inc. Portland, Oregon, SeaWest Windpower Inc. San Diego, California, and Bureau of Land Management, Rawlins District Office, Rawlins, Wyoming. January 10, 2003.

7.2 Laws, Acts, and Regulations

7 Code of Federal Regulations (CFR) § 658. 1984. Title 7 - Agriculture, Subtitle B - Regulations of the Department of Agriculture, Chapter VI - Natural Resources Conservation Service, Department of Agriculture, Subchapter F - Support Activities, Part 658 - Farmland Protection Policy Act. 7 CFR § 658, 7USC 4201-4209, 49 FR 27724. July 5, 1984. Available online: https://www.govinfo.gov/content/pkg/CFR-2010-title7-vol6/pdf/CFR-2010-title7-vol6-part658.pdf

7 United States Code (USC) §§ 4201-4209. 1973. Title 7 - Agriculture; Chapter 73 - Farmland Protection Policy; Sections (§§) 4201-4209. 7 USC 4201-4209. December 22, 1981. [Public Law 93-205, title XV, §1540, December 22, 1981, 95 Statute 1341.]. Available online: https://www.gpo.gov/fdsys/pkg/USCODE-2010-title7/pdf/USCODE-2010-title7-chap73.pdf

10 Code of Federal Regulations (CFR) § 1022.11. 2021. Title 10 Energy; Chapter X - Department of Energy (General Provisions); Part 1022 -Compliance with Floodplain and Wetland Environmental Review Requirements; Subpart B - Procedures for Floodplain and Wetland Reviews; Section (§) 1022.11 - Floodplain or Wetland Determination. 10 CFR 1022.11. [Amended November 12, 2021. Authority: 42 U.S. Code (USC) 7101 et seq.; 50 USC 2401 et seq.; Executive Order (EO) 11988, 42 Federal Register (FR) FR 26951, 3 CFR, 1977 Comp., p. 117; EO 11990, 42 FR 26961, 3 CFR, 1977 Comp., p. 121; EO 12372, 47 FR 30959, 3 CFR, 1982 Comp., p. 197.]. Available online: https://www.govinfo.gov/content/pkg/CFR-2021-title10-vol4/pdf/CFR-2021-title10-vol4-sec1022-11.pdf

40 Code of Federal Regulations (CFR) Part 1506. 1978. Title 40 - Protection of Environment; Chapter V - Council on Environmental Quality; Part 1506 - Other Requirements of NEPA. 40 CFR 1506. [43 Federal Register (FR) 56000, November 29, 1978.]. Available online: https://www.gpo.gov/fdsys/pkg/CFR-2009-title40-vol32/pdf/CFR-2009-title40-vol32-part1506.pdf and https://www.gpo.gov/fdsys/pkg/CFR-2009-title40-vol32/pdf/CFR-2009-title40-vol32-part1507.pdf

40 Code of Federal Regulations (CFR) Parts1500-1508. 1970. Title 40 - Protection of Environment; Chapter V - Council on Environmental Quality; Parts 1500-1508. 40 CFR 1500-1508. [NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 United States Code [USC] 4371 et seq.), section 309 of the Clean Air Act, as amended (42 USC 7609) and Executive Order (EO) 11514, March 5, 1970, as amended by EO 11991, May 24, 1977).

86 Federal Register (FR) 85: 23978-23979. 2021. Updated Collision Risk Model Priors for Estimating Eagle Fatalities at Wind Energy Facilities: Notice of Availability. Department of the Interior, Fish and Wildlife Service. 86 FR 23978. May 5, 2021. Available online: https://www.federalregister.gov/documents/2021/05/05/2021-09362/updated-collision-risk-model-priors-for-estimating-eagle-fatalities-at-wind-energy-facilities

Agriculture and Food Act. 1981. Also Known as the 1981 U.S. Farm Bill. Public Law (Pl) 97-98. 95 Statute 1213. December 22, 1981. Available online: https://www.govinfo.gov/content/pkg/PLAW-110publ234/pdf/PLAW-110publ234.pdf

Clean Water Act (CWA). 1972. 33 United States Code (USC) Sections (§§) 1251-1387. October 18, 1972.

Endangered Species Act (ESA). 1973. 16 United States Code (USC) Sections (§§) 1531-1544, Public Law (PL) 93-205, December 28, 1973, as amended, PL 100-478 [16 USC 1531 *et seq.*]; 50 Code of Federal Regulations (CFR) 402.

Federal Power Act. 1920. Federal Regulation and Development of Power, June 10, 1920. 16 United States Code (USC) 12 §§ 791-828c; Chapter 285, June 10, 1920; 41 Statute [Stat.] 1063.) as amended by: Chapter 129, March 3, 1921; 41 Stat. 1353.; Chapter 572, June 23, 1930; 46 Stat. 799.; Chapter 687, August 26, 1935; 49 Stat. 803.; Chapter 782, October 28, 1949; 63 Stat. 954.; Public Law (P.L.) 247, October 31, 1951; 65 Stat. 701.; P.L. 87-647, September 7, 1962; 76 Stat. 447.; P.L. 95-617, November 9, 1978; 92 Stat. 3117.; P.L. 96-294, June 30, 1980; 94 Stat. 611.; P.L. 97-375, December 21, 1982; 96 Stat. 1819.; P.L. 99-495, October 16, 1986; 100 Stat. 1243.; P.L. 102-486, October 24, 1992; 106 Stat. 3097.; P.L. 103-347, November 2, 1994; 108 Stat. 4585.; P.L. 104-66, December 21, 1995; 109 Stat. 718.

National Environmental Policy Act (NEPA). 1969. 42 United States Code Annotated (USCA) 4321-4370e. [Public Law 91-190, § 2, January 1, 1970, 83 Statute 852.]. Available online: https://www.gpo.gov/fdsys/pkg/USCODE-2015-title42/pdf/USCODE-2015-title42-chap55.pdf

National Historic Preservation Act (NHPA). 1966. Title 16 - Conservation; Chapter 1a - Historic Sites, Buildings, Objects, and Antiquities; Subchapter II - National Historic Preservation; Sections (§§) 470 Et Seq. Known as the National Historic Preservation Act of 1966. October 15, 1966.

Nebraska Department of Environmental Quality (NEDEQ). 2019a. Nebraska Administrative Code, Title 117. Revised September 20, 2019.

Nebraska Department of Environmental Quality (NEDEQ). 2019b. Nebraska Administrative Code, Title 129: Nebraska Air Quality Regulations. Revised June 24, 2019.

Safe Drinking Water Act (SDWA). 1974. Public Law (PL) 93-523; 88 Statute 1660; 42 United States Code (U.S.C.) §§ 300f - 300j26. Amended 1986 and 1996.

Appendix A. Technical Memorandum: Aquatic Resources Inventory at the Pronghorn Flats 115-kilovolt Wind Project, Western Ecosystems Technology, Inc.

(Document available through the Western Area Power Administration website linked with this Environmental Assessment)

Appendix A. Pronghorn Flats 115-kilovolt Wind Project Sound Modeling Report

(Document available through the Western Area Power Administration website linked with this Environmental Assessment)

Appendix B. Wildlife Studies at the Pronghorn Flats (Banner County) Wind Farm Complex

(Document available through the Western Area Power Administration website linked with this Environmental Assessment)

Appendix C. U.S. Fish and Wildlife Service Wyoming and Nebraska Ecological Services Field Office Information for Planning and Consultation Report for the Pronghorn Flats 115-kilovolt Wind Project

(Document available through the Western Area Power Administration website linked with this Environmental Assessment)

Appendix D. Pronghorn Flats 115-kilovolt Wind Project Shadow Flicker Final Report

(Document available through the Western Area Power Administration website linked with this Environmental Assessment)

Appendix E. Pronghorn Flats 115-kilovolt Wind Project Public Scoping Comments

(Document available through the Western Area Power Administration website linked with this Environmental Assessment)