Draft Supplemental Environmental Impact Statement for the Nebraska Public Power District Revised R-Project Habitat Conservation Plan

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COVER SHEET

Title of Proposed Action:	Issuance of Incidental Take Permit for the Nebraska Public Power District Revised R-Project Habitat Conservation Plan
Subject:	Draft Supplemental Environmental Impact Statement
Lead Agency:	U.S. Fish and Wildlife Service
Cooperating Agencies:	National Park Service – National Trails, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Nebraska Game and Parks Commission, and History Nebraska
County/State:	Multiple counties, Nebraska
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Abstract:
This supplemental environmental impact statement (EIS) evaluates the environmental consequences of the U.S. Fish and Wildlife Service (Service) issuing an incidental take permit (ITP) associated with the Nebraska Public Power District (NPPD) Revised R-Project Habitat Conservation Plan (HCP), in accordance with section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended. An HCP and Final EIS were prepared and an ITP was issued for this project in 2019. In 2020, the U.S. District Court for the District of Colorado vacated and remanded the ITP to the Service for further proceedings consistent with the court's order. In response, the NPPD prepared the Revised HCP and the Service prepared this supplemental EIS to support NPPD's new application for an ITP. NPPD is seeking take authorization from the Service for the American burying beetle. The permit, if issued, would authorize take of the American burying beetle that may occur incidental to NPPD's construction, operation, and maintenance of the R-Project transmission line. The supplemental EIS presents effects of the proposed HCP and two alternatives on geology and soils, water resources, wetlands, vegetation, wildlife, special status species, land use, recreation and tourism, cultural resources, transportation, visual resources and aesthetics, air quality and greenhouse gases, noise, hazardous materials and hazardous wastes, health and safety, socioeconomics, and environmental justice. The Service, as the federal lead agency, prepared this supplemental EIS pursuant to the requirements of the National Environmental Policy Act, as amended, and its implementing regulations. The Service will make a decision on whether to issue an ITP to the applicant, relying on the criteria for ITPs set forth in the ESA and its implementing regulations.

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Contents

Appendices

List of Tables

List of Figures

List of Abbreviations and Acronyms

ABB	American burying beetle
AMM	avoidance and minimization measure
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHT	California National Historic Trail
CRP	Conservation Reserve Program
CST	central standard time
EC	Electrical Conductivity
EMF	electric and magnetic field
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FRA	Federal Railroad Administration
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
GRP	Grassland Reserve Program
HCP	Habitat Conservation Plan
ITP	incidental take permit
K	Kelvin
LED	light-emitting diode
NAAQS	National Ambient Air Quality Standards
NCRC	Nebraska Central Railroad Company
NDEE	Nebraska Department of Environment and Energy
NDOT	Nebraska Department of Transportation
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act
NISP	Nebraska Invasive Species Program
NOI	Notice of Intent
NPPD	Nebraska Public Power District
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
OHV	off-highway vehicle
ONHT	Oregon National Historic Trail
OSL	Other Stewardship Lands
PCB	polychlorinated biphenyls
PENHT	Pony Express National Historic Trail
PFYC	Potential Fossil Yield Classification

SAR	Sodium Absorption Ratio
SEIS	Supplemental Environmental Impact Statement
Service	U.S. Fish and Wildlife Service
SHP	State Historical Park
SPP	Southwest Power Pool
SRA	State Recreation Area
SWPPP	stormwater pollution prevention plan
Thunderhead	Thunderhead Wind Energy Center
USGS	U.S. Geological Survey
WAPA	Western Area Power Administration
WMA	Wildlife Management Area

S.1 Introduction

In June 2019, the U.S. Fish and Wildlife Service (the Service or FWS) issued incidental take permit (ITP) #TE72710C-0 to the Nebraska Public Power District (NPPD). The permit authorized incidental take of the American burying beetle (*Nicrophorus americanus*) (ABB) that would result from the R-Project, a 345,000-volt, 226-mile-long transmission line in Nebraska. The *Federal Register* notice of availability for the ITP and associated Habitat Conservation Plan (HCP) and Final Environmental Impact Statement (FEIS) was published on February 8, 2019 (84 FR 2900).

In July 2019, a group of R-Project opponents filed a lawsuit challenging the Service's decision under the Endangered Species Act (ESA), National Environmental Policy Act (NEPA), and National Historic Preservation Act (NHPA). On June 17, 2020, the U.S. District Court for the District of Colorado (court) issued a decision. While the court found in favor of the Service on several counts, it identified certain discrete errors in the Service's decision-making process. In its ruling, the court vacated and remanded the ITP to the Service for further proceedings consistent with the court's order (*Oregon-California Trails Association v. Walsh*, 1:19-cv-01945-WJM, D. Colo 2020).[1]

In response to the court decision, NPPD developed the Revised HCP. Any reference to the HCP in this Supplemental Environmental Impact Statement (SEIS) is now a reference to the Revised HCP (NPPD 2023). The Service prepared this SEIS to the FEIS to respond to NPPD's revised HCP, address the issues identified by the court ruling, and address new information, as relevant.

The SEIS incorporates by reference, where applicable, FEIS information per CEQ regulations (40 CFR 1501.12).

S.2 Purpose and Need for Federal Action

The purpose of the federal action of approving an HCP and issuing an ITP is to fulfill the Service's authority under ESA Section 10(a)(1)(B) by responding to NPPD's application requesting authorization of incidental take of ABB. Nonfederal applicants such as NPPD, whose otherwise lawful activities may result in take of ESA-listed wildlife, can apply to the Service for an ITP so that their covered activities may proceed without potential violations of ESA Section 9. For the Service to fulfill its responsibilities and obligations under ESA, it must comply with a number of environmental laws and regulations, Executive Orders (EOs), and agency directives and policies.

The need for the federal action is for the Service to respond to NPPD's application for an ITP under the authority of ESA Section 10(a)(1)(B) to determine if it meets issuance criteria. The Service needs to ensure that the ITP and implementation of the HCP complies with other applicable federal laws, regulations, treaties, and applicable EOs, as appropriate. If the Service approves the application and issues an ITP, it would authorize NPPD to incidentally take ABB as a result of the covered activities associated with the R-Project. The Service has prepared this SEIS to inform the public of the proposed action and the effects of the proposed action and its alternatives, including addressing any new information since the FEIS and addressing the 2020 court decision; seek information from the

[1] References for sources cited in this SEIS are provided in Appendix A, *References*.

public; and use information collected and analyzed to make better informed decisions concerning the ITP application.

S.3 Public Review of the Draft SEIS

The Service conducted scoping for the SEIS, although scoping is not required for supplemental NEPA documents under CEQ regulations. On November 18, 2022, the Service published a Notice of Intent (NOI) in the *Federal Register* to inform the public of its intent to prepare an SEIS to assess the impacts on the human environment related to the proposed issuance of the ITP and implementation of the Revised HCP (87 FR 69294). The NOI initiated a 30-day comment period for public review and comment on the SEIS and announced two virtual public scoping meetings on December 8, 2022. Details on the public outreach, virtual meetings, and scoping comments can be found in Appendix A, *Scoping*.

The Draft SEIS and Revised HCP are being concurrently released for public review. Submitted comments will be considered and addressed in the Final EIS. The Service will hold three public meetings (two in-person and one virtual) during the comment period.

S.4 Decision to Be Made

The Service is reviewing the ITP application received from NPPD and will base its decision on the statutory and regulatory criteria of the ESA. This decision will also be informed by the data, analyses, and findings in this SEIS and public comments received on the SEIS and Revised HCP. The Service will document its determination in an ESA Section 10 findings document, ESA Section 7 biological opinion, and NEPA Record of Decision developed at the conclusion of the ESA and NEPA compliance processes. If the Service finds that all requirements for issuance of the ITPs are met, it will issue the requested ITP, subject to terms and conditions deemed necessary or appropriate to carry out the purposes of ESA Section 10.

S.5 Alternatives

S.5.1 No Action Alternative

The information in FEIS Section 2.3, *No Action Alternative*, has not changed and is incorporated by reference in this SEIS. In summary, under the no action alternative, the Service would not issue an ITP for the R-Project, NPPD would not implement the HCP, and the R-Project would not be constructed.

S.5.2 Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP; Preferred Alternative)

The proposed action, and the Service's preferred alternative, is the current R-Project and Revised HCP. The proposed action is largely similar to the 2018 proposed R-Project route described in the FEIS and is incorporated by reference in this SEIS, with changes described herein.

FEIS Section 2.4, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, describes the 2018 proposed R-Project route; transmission line structure types and foundations; conductors and associated hardware; overhead shield (ground) wires; minor additional hardware; substation design; communications system; transmission line construction (e.g., surveying and staking, tree clearing, construction access); substation construction/expansion; site restoration; special construction practices (e.g., construction with helicopters, well relocation); operations and maintenance practices (e.g., transmission line inspection, emergency repairs); ITP covered activities; mitigation for impacts of take; and avoidance and minimization measures.

Modifications and changes to the 2018 proposed R-Project include the following:

- The majority of the Holt County Substation has been removed from the R-Project and was constructed separate from the R-Project in May 2022. As such, the microwave communications link at the Holt County Substation described in FEIS Section 2.4., *Communications System*, is no longer part of the R-Project.
- As stated in SEIS Section 2.2, *NPPD Process for Selecting Its Final Route*, NPPD has made a route adjustment around O'Fallon's Bluff, a National Register of Historic Places (NRHP)-listed historic property, reducing impacts to the property. This route adjustment has resulted in an increase in the length of the proposed transmission line from 225 miles to 226 miles. This route adjustment is reflected in Figure 1-1 and Figure 2-1.
- NPPD has revised its treatment of construction access for purposes of covered activities under the Revised HCP. Rather than using three access scenarios and covering only two, all construction access is now treated as a covered activity in the Revised HCP (due to the possibility of crushing an ABB that is buried in leaf litter on the surface) and is classified as either temporary or permanent. The overall amount of access needed for the R-Project has not changed, just its treatment in the Revised HCP. However, because overland travel that does not involve blading or grading is now included in the amount of disturbance from construction access, the total estimated temporary disturbance associated with construction access for the project has increased from 258 acres to 527 acres.
- NPPD added a new covered activity to the Revised HCP, referred to as a *construction contingency*, to account for the possibility that work may be required during construction that could not have been predicted. Examples of activities that would fall into this construction contingency include, but are not limited to: relocation of an access route or work area developed for construction purposes that became flooded during the course of construction; unforeseen sensitive-resource discoveries; landowner changes to the existing land use that necessitate a change in the construction process; or NPPD's accommodation of landowner requests that result in minor changes in the construction process. NPPD would limit total disturbance from this covered activity to 40 acres.
- NPPD would mark the entirety of the R-Project with bird flight diverters to minimize bird collision risk, compared to NPPD's 2018 HCP, which only included marking of lines on segments with high risk for collisions.
- NPPD would mark 124 miles of its existing transmission lines with bird flight diverters. Existing lines that have the potential for marking include the 115 kV transmission line between Thedford Substation and the Ainsworth Substation, lines within the federally designated Whooping Crane Critical Habitat along the Platte River, and lines in areas identified as whooping crane extended-use core intensity areas in Pearse et al. (2015).

- NPPD modified the list of avoidance and minimization measures in the Revised HCP. The modifications include the following revisions to FEIS Section 2.4.16, *Avoidance and Minimization Measures*:
    - NPPD removed mowing and windrowing of vegetation, carrion removal, and use of low-ground-pressure equipment as avoidance and minimization measures in the Revised HCP. The Service no longer recommends mowing and carrion-removal efforts as avoidance measures (FWS 2022). The use of low-ground-pressure equipment is no longer necessary due to the Revised HCP treating all construction access as a covered activity.
    - NPPD revised the terminology "winter construction" to "non-active season construction" to more accurately reflect the relevant period for minimizing impacts on ABB.
    - NPPD revised the terminology "sodium vapor lighting and downshield lighting" to "downshielded and low-temperature LED lighting at substations and temporary work areas, if necessary" to reflect the current recommended lighting type to reduce effects on ABB.

Due to the changes in the treatment of construction access, the addition of the construction contingency, and the completion of some construction on the R-Project under ITP #TE72710C-0, the Revised HCP includes an updated Table 2-1, which describes the HCP's covered activities.

S.5.3 Alternative A: 2018 Final EIS R-Project and HCP

Alternative A is the FEIS proposed R-Project and HCP, as described in FEIS Section 2.4, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and is incorporated in this SEIS by reference. Alternative A does not incorporate the changes to the current proposed action, described in SEIS Section 2.4, *Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)*.

S.5.4 Alternative B: Tubular Steel Monopole Construction Only

Most of the information in FEIS Section 2.5, *Alternative B: Tubular Steel Monopole Construction Only*, has not changed and is incorporated in this SEIS by reference. Under Alternative B, the Service would issue an ITP for NPPD's current R-Project, and NPPD would implement the Revised HCP. Alternative B would use only tubular steel monopoles for all proposed transmission line towers, but otherwise, the R-Project would be the same as the Proposed Action, as described in SEIS Section 2.4, *Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)*.

S.6 Summary of Affected Environment and Impact Analysis

Since publication of the FEIS, changes have occurred, as summarized in the introduction to SEIS Chapter 3 (Section 3.1). These changes are taken into consideration in the affected environment and environmental consequences in the Chapter 3 resource sections (Sections 3.2 through 3.18). As described in Section S.1, *Introduction*, the Service issued an ITP to NPPD in 2019, and NPPD

undertook some construction activities before the ITP was vacated by the court and remanded. SEIS Table 3.1-1 summarizes the activities conducted between June 2019 and June 2020 under that ITP.

Since publication of the FEIS and the court order, the proposed action has been modified to include a route adjustment intended to reduce impacts on O'Fallon's Bluff. This route change results in modifications to the estimated acreage of temporary and permanent disturbance (see SEIS Section 3.1.2). As described in SEIS Section 3.1.3, *Related Renewable Energy Projects*, related renewable energy projects that the Service has determined to be both reasonably foreseeable and related to the R-Project are analyzed as indirect effects of the proposed action and alternatives in the Chapter 3 resource sections. The analysis of these projects considers the effects of construction, operation, and maintenance of wind turbine towers, photovoltaic solar panels, and associated infrastructure.

SEIS Section 3.1.4 describes the approach to characterizing baseline conditions and conducting the effects analysis.

Table ES-1 summarizes the effects of the proposed action, Alternative A, and Alternative B for all resources analyzed in the SEIS. The SEIS uses the same terminology as the FEIS to describe the potential effects of the proposed action and alternatives: short term, long term, low intensity, moderate intensity, and high intensity. FEIS Table 3.1-2 defines these terms in the context of each resource topic and is incorporated by reference into this SEIS. The no action alternative is not included in Table ES-1 because there would be no R-Project or HCP and therefore no effects on any of the resources, except for socioeconomics. Although the R-Project under the SEIS proposed action includes changes (e.g., a minor reroute and greater temporary disturbance area) compared to Alternative A (FEIS proposed action), the types, duration, and intensity of effects would be the same under the proposed action and Alternative A. The types, duration, and intensity of effects of Alternative A would be the same as described in the FEIS and are incorporated by reference. Compared to the proposed action and Alternative A, Alternative B would result in a greater area of temporary disturbance from access roads and structure work areas associated with transporting and installing tubular steel monopoles (SEIS Table 3.1-2). Despite the greater area of temporary disturbance, the types, duration, and intensity of effects on resources would be the same for Alternative B as for the proposed action and Alternative A.

Table ES-1 also summarizes the effects of construction, operation, and maintenance of the related renewable energy projects, which are analyzed as indirect effects of the proposed action and alternatives in the SEIS. In analyzing potential effects on special status species from the related renewable energy projects, the Service assumes that all project developers comply with ESA Section 9. In consideration of these indirect effects, which were not described in the FEIS, the proposed action and alternatives would have the same duration and intensity of effects on all resources as described in the FEIS, except special status species, for which there would be a greater intensity of effect on some species than was described in the FEIS.

Chapter 3, *Affected Environment and Environmental Consequences*, provides a detailed analysis of potential effects. Cumulative impacts are analyzed in SEIS Chapter 4, *Cumulative Effects*, and are not included in the table.

Table ES-1. Summary of Potential Impacts

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
Geology, Mineral Resources, Paleontological Resources, and Soils			
The greater estimated area of disturbance would increase the area of effects compared to the FEIS proposed action, but the types, duration and intensity would be the same as described in the FEIS for the FEIS proposed action (short and long term, low to moderate intensity).	Effects would be the same as described for Alternative A in the FEIS.	The increased estimated area of disturbance would increase effects on sensitive soils, prime farmland, and soils with limited restoration potential compared to the proposed action, but the duration and intensity of effects would be the same as under the proposed action and as described for Alternative B in the FEIS (short and long term, low to moderate intensity).	Construction, operation, and maintenance of the projects could result in short- and long-term, low-intensity effects on local surface geology from compaction; short- and long-term, low-intensity effects on access to mineral resources; long-term, low- to moderate-intensity effects on paleontological resources from ground-disturbing activities; and short- and long-term, low-intensity effects on soils (e.g., loss of surface lands and soil productivity and quality), prime farmlands, and soil restoration potential.
Water Resources			
One additional stream would be crossed by the proposed action compared to the FEIS proposed action, but the types, duration and intensity of effects on surface water would be the same as described in the FEIS for the FEIS proposed action (short and long term, low intensity). The duration and intensity of effects on groundwater quality would be the same as described in the FEIS for the FEIS proposed action (short and long term, low intensity). Effects on groundwater quantity and flow (not described in the FEIS) would be short and long term and low intensity. There would be less estimated disturbance to floodplain vegetation types than under the FEIS proposed action but the duration and intensity of effects on floodplains would be	Effects would be the same as described for Alternative A in the FEIS. Effects on groundwater quantity and flow would be the same as under the SEIS proposed action.	The increased estimated area of disturbance would increase the effects on groundwater and floodplains compared to the proposed action, but the duration and intensity of effects on water resources would be the same as described for Alternative B in the FEIS (short and long term, low intensity).	Construction would result in short-term, low- to moderate-intensity effects on surface water, while the operation and maintenance would result in long-term, low-intensity effects. Construction would result in short-term, low-intensity effects on groundwater, while operation and maintenance would result in long-term, low-intensity effects. Short- and long-term, low-intensity effects on floodplains could result from ground disturbance.

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
the same as described for the FEIS proposed action (short and long term, low intensity).			
Wetlands			
The transmission line structures would span wetlands and avoid direct, permanent wetland disturbance, but the duration and intensity of effects would be the same as described for the FEIS proposed action (short term, low to moderate intensity; long term, low intensity).	Effects would be the same as described for Alternative A in the FEIS.	The greater estimated area of temporary disturbance would increase the amount of disturbance to wetlands compared to the proposed action, but the duration and intensity of effects would be the same as described for Alternative B in the FEIS (short term, low to moderate intensity; long term, low intensity).	Short- and long-term, low- to moderate-intensity effects could occur from the disturbance of wetlands (e.g., through placement of facilities in wetlands, sedimentation into wetlands). Short- and long-term, low- to moderate-intensity effects could also occur from changes in wetland hydrology (e.g., culverts, bridges, or access roads could alter flows, which could subsequently affect runoff and groundwater).
Vegetation			
The greater estimated area of temporary and permanent disturbance would increase the area of effects on vegetation compared to the FEIS proposed action, but the duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term, low to moderate-intensity).	Effects would be the same as described for Alternative A in the FEIS.	The greater estimated area of disturbance would increase effects on vegetation compared to the proposed action. The duration and intensity of effects would be the same as described for Alternative B in the FEIS (short and long term, low to moderate intensity).	Types of effects on vegetation would include changes in vegetation cover, spread of invasive plants, exposure to pollutants and hazardous materials, erosion and fugitive dust, and loss of pollinators. Effects from changes in vegetation cover and the spread of invasive plants would be short and long term and low to moderate intensity. All other effects would be short and long term and low intensity.
Wildlife			
The greater estimated area of temporary and permanent disturbance and the reroute around O'Fallon's Bluff would result in minor differences in estimated disturbance of vegetation communities and associated wildlife habitat, and inclusion of line marking devices on all of the proposed transmission line would reduce the potential for bird	Effects would be the same as described for Alternative A in the FEIS.	The same differences between the proposed action and the FEIS proposed action would apply to Alternative B. The greater estimated area of disturbance would increase disturbance and short-term habitat loss to wildlife species,	Types of effects would include injury or mortality from construction and maintenance equipment, disturbance from construction and maintenance activities, temporary or permanent loss of habitat, and injury or mortality from collisions with operating wind turbines. The intensity of effects would depend on species and project siting and would range from low to

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
collisions, but the duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term, low to moderate intensity).		compared to the proposed action. The duration and intensity of effects would be the same as described for Alternative B in the FEIS (short and long term, low to moderate intensity).	moderate intensity. Species with the greatest risk of collision with wind turbines (passerines, raptors, and migratory tree-roosting bats) would be most likely to be adversely impacted by wind energy development.
Special Status Species			
Special Status Insects. The proposed action would result in temporary and permanent habitat loss, injury, and mortality of special status insect species. Effects would be short and long term and low intensity, except for ABB, American bumble bee, and variable cuckoo bumble bee, for which effects would be of moderate intensity.	Effects would be the same as described for Alternative A in the FEIS. Types and intensity of effects on special status insects not analyzed in the FEIS would be the same as under the SEIS proposed action.	The greater estimated area of disturbance would increase temporary and permanent habitat loss, compared to the proposed action, but the duration and intensity of effects would be the same as described for Alternative B in the FEIS. Effects on most special status insect species would be short and long term and low intensity, except for ABB, American bumble bee, and variable cuckoo bumble bee, for which effects would be moderate intensity.	Types of effects would include injury or mortality to individuals from construction and operation activities and loss, fragmentation, or alteration of habitat from landcover conversion that would result in short- and long-term and low- to moderate-intensity effects. Long-term effects on ABB from habitat fragmentation and alteration, disturbance, and individual mortality could be of moderate intensity. For all other special status insect species, effects would be low to moderate intensity, depending on the species and project siting.
Special Status Avian and Bat Species. The proposed action would result in temporary and permanent habitat loss for special status birds and bats. Inclusion of line marking devices on all of the proposed transmission line would reduce the potential for bird collisions. Duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term; low intensity).	Effects would be the same as described for Alternative A in the FEIS. Types and intensity of effects on special status bat species not analyzed in the FEIS would be the same as under	The greater estimated area of disturbance would increase temporary and permanent habitat loss compared to the proposed action, but the duration and intensity of effects would be the same as described for Alternative B in the FEIS (short and long term; low intensity).	Types of effects would include injury or mortality to individuals from construction and operation activities and loss, fragmentation, or alteration of habitat from landcover conversion that would result in short- and long-term and low- to moderate-intensity effects. Effects on special status bat species would range from low to moderate, depending on the species and project siting. Effects on special status bird species would be similar to those described for general avian and bat species and would range

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
	the SEIS proposed action.		from low to moderate intensity depending on the species and project siting (SEIS Section 3.6, *Wildlife*). Effects on bald eagle from the related renewable wind projects would be long term and moderate intensity. Effects on whooping crane from the related wind energy projects would be long term and low intensity.
Special Status Mammals. Because of the range of the swift fox (the only non-bat special status mammal species known to occur in the study area) the proposed action would not directly affect this species, as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	Effects would be the same as under the proposed action and as described for Alternative B in the FEIS (no effect).	Types of effects would include loss, fragmentation, or alteration of habitat from landcover conversion that would result in long-term, low-intensity effects on the swift fox.
Special Status Reptiles. The proposed action may result in temporary habitat loss and short- and long-term disturbance from maintenance and emergency activities over the life of the project, but the duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term; low intensity).	Effects would be the same as described for Alternative A in the FEIS.	The greater estimated area of disturbance would increase temporary and permanent habitat loss compared to the proposed action, but the duration and intensity of effects would be the same as described for Alternative B in the FEIS (short and long term; low intensity).	Types of effects would include loss, fragmentation, or alteration of habitat from landcover conversion that would result in short- and long-term, low-intensity effects on special status reptiles.
Special Status Fish. Emergency activities could result in short-term effects on special status fish species with habitat occurring in streams crossed by the proposed transmission line, but the duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term; low intensity).	Effects would be the same as described for Alternative A in the FEIS.	The greater estimated area of disturbance would increase temporary and permanent habitat loss compared to the proposed action but the duration and intensity of effects would be the same as described for Alternative B in the FEIS (short and long term; low intensity).	Types of effects would include loss, fragmentation, or alteration of habitat from landcover conversion and indirect effects from sedimentation and contamination of streams that would result in short- and long-term, low-intensity effects.
Special Status Plants. Construction activities may result in temporary disturbance of 320	Effects would be the same as	The greater estimated area of disturbance would increase	Types of effects would include injury or mortality to individuals from construction and

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
acres of suitable western prairie fringed orchid habitat and small white lady's slipper orchid, but the duration and intensity to special status plants would be the same as described for the FEIS proposed action (short and long term; low intensity).	described for Alternative A in the FEIS.	temporary and permanent habitat loss compared to the proposed action but the duration and intensity of effects would be the same as Alternative B in the FEIS (short and long term; low intensity).	operation activities and loss, fragmentation, or alteration of habitat from landcover conversion. The co-occurrence of western prairie fringed orchid and small white lady's slipper orchid habitat with wetlands increases the likelihood that projects would avoid habitat for these species, and overall effects would be short and long term and low intensity.
Land Use			
Types and intensity of effects would be the same as described in the FEIS for the FEIS proposed action. The increased estimated area of disturbance would increase potential short-and long-term effects on land use compared to the FEIS proposed action, but the duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term, low to moderate intensity).	Effects would be the same as described for Alternative A in the FEIS.	The estimated area of disturbance is larger than the proposed action but the duration and intensity of effects would be the same as Alternative B in the FEIS and the proposed action (short and long term, low to moderate intensity).	The related renewable energy projects could result in adverse effects on land uses if construction, operation, and maintenance of facilities displaced, altered, or otherwise physically affected existing or planned agricultural, residential, commercial, industrial, governmental, institutional, or public or private infrastructure uses or facilities. Effects on agricultural land use would be short and long term and low to moderate intensity. All other effects on land uses would be short and long term and low intensity.
Recreation			
Effects would be the same as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	Effects would be the same as described for Alternative B in the FEIS.	Effects on recreational quality and access to recreation activities associated with construction (e.g., noise, dust, traffic, and the presence of construction equipment and workers) would be short term and low intensity. There could be short- and long-term, low-intensity effects on recreation from the visual effects of facilities.
Cultural Resources			
Types, duration, and intensity of effects would be the same as described for the FEIS proposed action, except that the proposed	Effects would be the same as described for	Effects would be the same as described for Alternative B in the FEIS, except that the route	The intensity of effects could range from low, moderate, to high intensity (including potentially significant adverse impacts)

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
route has been adjusted to avoid or minimize adverse effects on O'Fallon's Bluff, an NRHP-listed historic property associated with remnant segments of the Oregon-California National Historic Trails. As described for the FEIS proposed action, there would be the potential for significant effects on cultural resources. There is ongoing coordination regarding the identification, evaluation, and assessment of effects of cultural resources in the study area in accordance with Section 106 of the NHPA. Consultation with Tribal nations and consulting parties is also ongoing.	Alternative A in the FEIS.	adjustment around O'Fallon's Bluff (included in the proposed action) would apply.	depending on the exact timing and location of project construction, but adverse effects would likely be minimized or mitigated by developers' adherence to applicable federal, state, and county requirements.
Transportation			
Effects would be the same as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	Effects would be the same as described for Alternative B in the FEIS.	Types of effects would include changes in roadway access and railroad or aviation transportation infrastructure from construction, operation, and maintenance. Effects would be short and long term and low intensity.
Visual Resources			
Compared to the FEIS proposed action, there would be increased visual disturbance from line marking along the entire proposed transmission line and reduced effects on visual quality of views at the O'Fallon's Bluff site due to the reroute. There would be high-intensity effects on the visual quality of views from the Horseshoe Bar Ranch conservation easement (not in place during preparation of the FEIS). However, the duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term; ranging from low to high intensity depending on location). As	Effects would be the same as described for Alternative A in the FEIS. Effects on the visual quality of views from the Horseshoe Bar Ranch conservation easement would be the same as	Types of effects would be the same as under the proposed action. The same differences between the proposed action and the FEIS proposed action would apply to Alternative B. The duration and intensity of effects would be the same as described for Alternative B in the FEIS (short and long term; ranging from low to high intensity depending on location). As described in the FEIS, there would be the	Short-term construction effects (e.g., reduction in visual quality from construction equipment and materials) would be low intensity. Effects on visual quality from the presence of wind and solar infrastructure would be long term and moderate to high intensity, depending on final project siting. Long-term, moderate-intensity effects from light and glare would include glare from solar panels, shadow flicker from wind turbines, and lighting for facility security.

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
described for the FEIS proposed action, there would be the potential for significant effects on visual resources.	under the proposed action.	potential for significant effects on visual resources.	
Air Quality and GHGs			
The greater estimated area of disturbance would increase effects on air quality compared to the FEIS proposed action, but the duration and intensity of impacts would be the same as described for the FEIS proposed action (short term, low to moderate intensity and long term, low intensity).	Effects would be the same as described for Alternative A in the FEIS.	The increased area of disturbance would increase effects on air quality compared to the proposed action, but the duration and intensity of effects would be the same as described for Alternative B in the FEIS (short term, low to moderate intensity and long term, low intensity).	Effects from construction and maintenance equipment and vehicle emissions would be short term and low intensity. Operational effects would be beneficial and low intensity (i.e., displacement of energy produced by fossil fuel sources).
Noise			
Effects would be the same as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	Effects would be the same as described for Alternative B in the FEIS.	Effects from noise generation during construction of the related renewable energy projects would be short term and low to moderate intensity. Effects from operation, and maintenance of the related renewable energy projects would be long term and low intensity.
Hazardous Materials and Hazardous Wastes			
Effects would be the same as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	Effects would be the same as described for Alternative B in the FEIS.	Effects from the related renewable energy projects related to accidental spills of hazardous materials or wastes would be short and long term and low intensity.
Health and Safety			
Effects would be the same as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	Effects would be the same as described for Alternative B in the FEIS.	Effects from onsite hazards for workers, electromagnetic field exposure, and shadow flicker would be short and long term and low intensity.

Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)	Alternative A: 2018 Final EIS R-Project and HCP	Alternative B: Tubular Steel Monopole Construction Only	Related Renewable Energy Projects (Applicable to Proposed Action, Alternative A, and Alternative B) (Indirect Effects)
Socioeconomics			
Although the affected environment has changed since publication of the FEIS (e.g., population numbers), the types, duration, and intensity of effects would be the same as described for the FEIS proposed action.	Effects would be the same as described for Alternative A in the FEIS.	As described for the proposed action, although the affected environment has changed since publication of the FEIS (e.g., population numbers), the types, duration, and intensity of effects would be the same as described for Alternative B in the FEIS.	Effects on demographic characteristics (e.g., population, income and poverty, racial and ethnic characteristics) would be short and long term and low intensity. Beneficial effects on economic conditions (e.g., temporary or permanent increases in jobs) would be short and long term and low intensity. Adverse effects on economic conditions (e.g., financial losses from disruption in agricultural operations or temporary land disturbance during construction) would be short term and could range from low to high intensity depending on project siting and timing.
Environmental Justice			
There were no environmental justice (EJ) minority or low-income areas identified in the study area for EJ effects, and there would be no disproportionate and adverse impacts on minority or low-income communities. The duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term; no effect or low intensity).	Effects would be the same as described for Alternative A in the FEIS.	As described for the proposed action, there were no EJ minority or low-income areas identified in the study area for EJ effects and there would be no disproportionate and adverse impacts on minority or low-income communities. The duration and intensity of effects would be the same as under the proposed action and as described for Alternative B in the FEIS (short and long term; no effect or low intensity).	Minority and low-income populations in the study area may experience adverse short- and long-term effects. However, because all residents in the study area would experience similar effects, effects would not fall disproportionately on EJ populations.

Chapter 1
Purpose and Need

1.1 Introduction

U.S. Fish and Wildlife Service (Service) issued incidental take permit (ITP) #TE72710C-0 to the Nebraska Public Power District (NPPD) on June 12, 2019, authorizing incidental take of the American burying beetle (*Nicrophorus americanus*) (ABB) that would result from the R-Project, a 345,000-volt, 226-mile-long transmission line in Nebraska. The *Federal Register* (FR) notice of availability for the ITP and associated Habitat Conservation Plan (HCP) and Final Environmental Impact Statement (FEIS) was published on February 8, 2019 (84 FR 2900).

In July 2019, a group of R-Project opponents filed a lawsuit challenging the Service's decision under the Endangered Species Act (ESA), National Environmental Policy Act (NEPA), and National Historic Preservation Act (NHPA). On June 17, 2020, the U.S. District Court for the District of Colorado (court) issued a decision. While the court found in favor of the Service on several counts, it identified certain discrete errors in the Service's decision-making process. In its ruling, the court vacated and remanded the ITP to the Service for further proceedings consistent with the court's order (*Oregon-California Trails Association v. Walsh*, 1:19-cv-01945-WJM, D. Colo 2020).

In response to the court decision, NPPD developed a revised HCP and ITP permit application. Any reference to the HCP is now a reference to the Revised HCP (NPPD 2023[1]) in this Supplemental Environmental Impact Statement (SEIS).

The Service prepared this SEIS to the FEIS to respond to NPPD's Revised HCP and ITP application, address the issues identified by the court ruling, and address new information, as relevant. This SEIS was prepared in accordance with NEPA, as amended, and the NEPA implementing regulations issued by the president's Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500–1508) and the Department of the Interior (43 CFR 46). This SEIS has also been prepared in accordance with the Builder Act of the Fiscal Responsibility Act of 2023, signed into law on June 3, 2023, (Title III.-Permitting Reform Section 321), which amended NEPA by revising Section 102(2) and by adding Sections 106–111 to the statute.

The SEIS incorporates by reference, where applicable, FEIS information per CEQ regulations (40 CFR 1501.12).

1.2 Project Background

The information in FEIS Section 1.2, *Project Background*, is mostly unchanged and summarizes NPPD's R-Project, the R-Project study area, ABB and its presence in the study area, the R-Project potential for ABB take/need for an HCP, the permit term duration, and the ITP permit area. FEIS Section 1.2, *Project Background*, is incorporated by reference, except for the following changes in information relevant to the project background since issuance of the FEIS.

- The plan area and final R-Project route, as described in the Revised HCP and shown in Figure 1-1.

[1] References for sources cited in this SEIS are provided in Appendix A, *References*.

- Figure 1-2, *American Burying Beetle Predicted Probability of Occurrence in Nebraska Sand Hills Ecoregion*, has been revised to show the permit area, as included in the Revised HCP.
- The Service reclassified ABB from endangered to threatened on November 16, 2020, and finalized a 4(d) rule describing prohibited and nonprohibited take of the species (85 FR 65241). Recent litigation contested the decision to reclassify ABB from endangered to threatened and the associated 4(d) rule, but the U.S. District Court for the District of Columbia upheld the Service's reclassification of ABB (*Center for Biological Diversity v. U.S. Fish & Wildlife Service, D.D.C. Case No. 1:21-cv-00791*). While the Revised HCP acknowledges the updates to prohibited take associated with the 4(d) rule NPPD and the Revised HCP treat ABB as if typical Section 9 prohibitions were in effect and the final 4(d) rule was not in place (Revised HCP Section 5.1, *American Burying Beetle*).
- On November 4, 2021, the Southwest Power Pool (SPP) issued a revised Notice to Construct the R-Project, which removed the majority of the Holt County Substation from the R-Project, allowing construction of that substation to proceed separate from and regardless of the R-Project. NPPD completed construction of the Holt County Substation in May 2022. The only portion of the substation that remains part of the R-Project is the work to include the R-Project line in the substation line bay.
- Any other R-Project changes and changes to the Revised HCP are described in SEIS Chapter 2, *Alternatives*.

In addition to these differences and changes to the project background, NPPD completed certain R-Project activities while ITP #TE72710C-0 was in effect from June 2019 to June 2020, the time between the Service issuing the ITP and the court remand vacating the ITP. During this time, NPPD engaged in these activities under the ITP and a joint stipulation agreement between parties to the litigation. These activities are described in Chapter 3, *Affected Environment and Environmental Consequences*.

1.3 Species Covered by Incidental Take Permit and Habitat Conservation Plan

The information in FEIS Section 1.3, S*pecies Covered by Incidental Take Permit and Habitat Conservation Plan*, has not changed since publication of the FEIS. ABB is the only federally listed species covered in the Revised HCP.

1.4 Purpose of the Service's Proposed Action

The purpose of the Service's proposed action has been modified from the statement presented in FEIS Section 1.4, *Purpose of the Service's Proposed Action*.

The purpose of the federal action of approving an HCP and issuing an ITP is to fulfill the Service's authority under ESA Section 10(a)(1)(B) by responding to NPPD's application requesting authorization of incidental take of ABB. Nonfederal applicants such as NPPD, whose otherwise lawful activities may result in take of ESA-listed wildlife, can apply to the Service for an ITP so that their covered activities may proceed without potential violations of ESA Section 9. For the Service to

fulfill its responsibilities and obligations under ESA, it must comply with a number of environmental laws and regulations, Executive Orders (EOs), and agency directives and policies.

The Service will evaluate the application to ensure that issuance of the ITP and implementation of the HCP achieve long-term species and conservation objectives at appropriate scales and ensure that the conservation actions approved with issuance of the ITP are capable of supporting species mitigation projects over the permit term.

1.5 Need for the Service's Proposed Action

The need for the Service's proposed action has been modified from the statement presented in FEIS Section 1.5, *Need for the Service's Proposed Action*.

The need for the federal action is for the Service to respond to NPPD's application for an ITP under the authority of ESA Section 10(a)(1)(B) to determine if it meets issuance criteria. The Service needs to ensure that the ITP and implementation of the HCP complies with other applicable federal laws, regulations, treaties, and applicable EOs, as appropriate. If the Service approves the application and issues an ITP, it would authorize NPPD to incidentally take ABB as a result of the covered activities associated with the R-Project.

The Service has prepared this SEIS to inform the public of the proposed action and the effects of the proposed action and its alternatives, including addressing any new information since the FEIS and addressing the 2020 court decision; seek information from the public; and use information collected and analyzed to make better informed decisions concerning the ITP application.

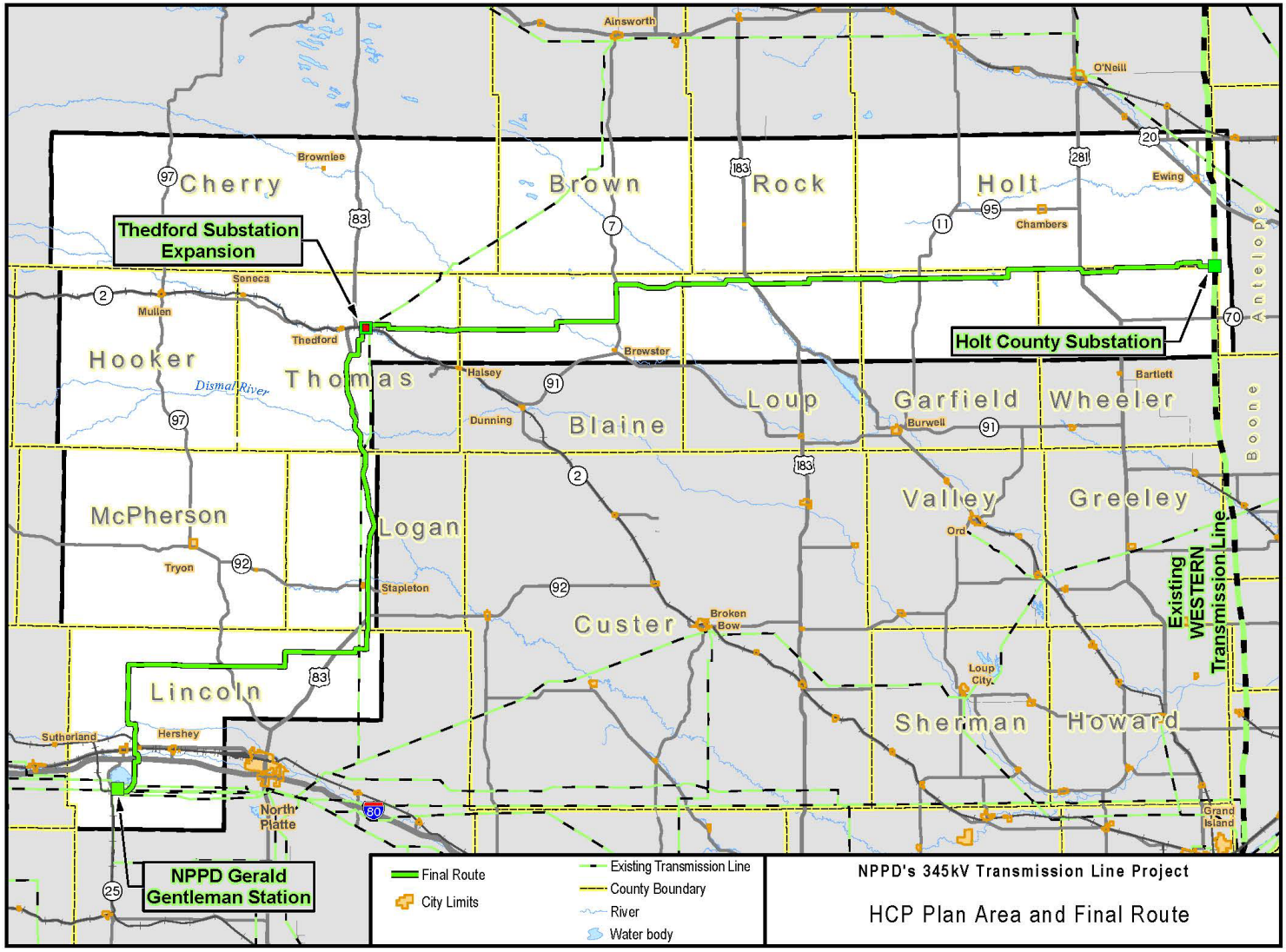
1.6 The Service's Proposed Action

The information in FEIS Section 1.6, *The Service's Proposed Action*, has not changed and is incorporated in this SEIS by reference. In summary, the Service's proposed action is the issuance of an ESA Section 10(a)(1)(B) ITP for ABB for covered activities proposed in the Revised HCP.

1.7 Nebraska Public Power District's Need for the R-Project

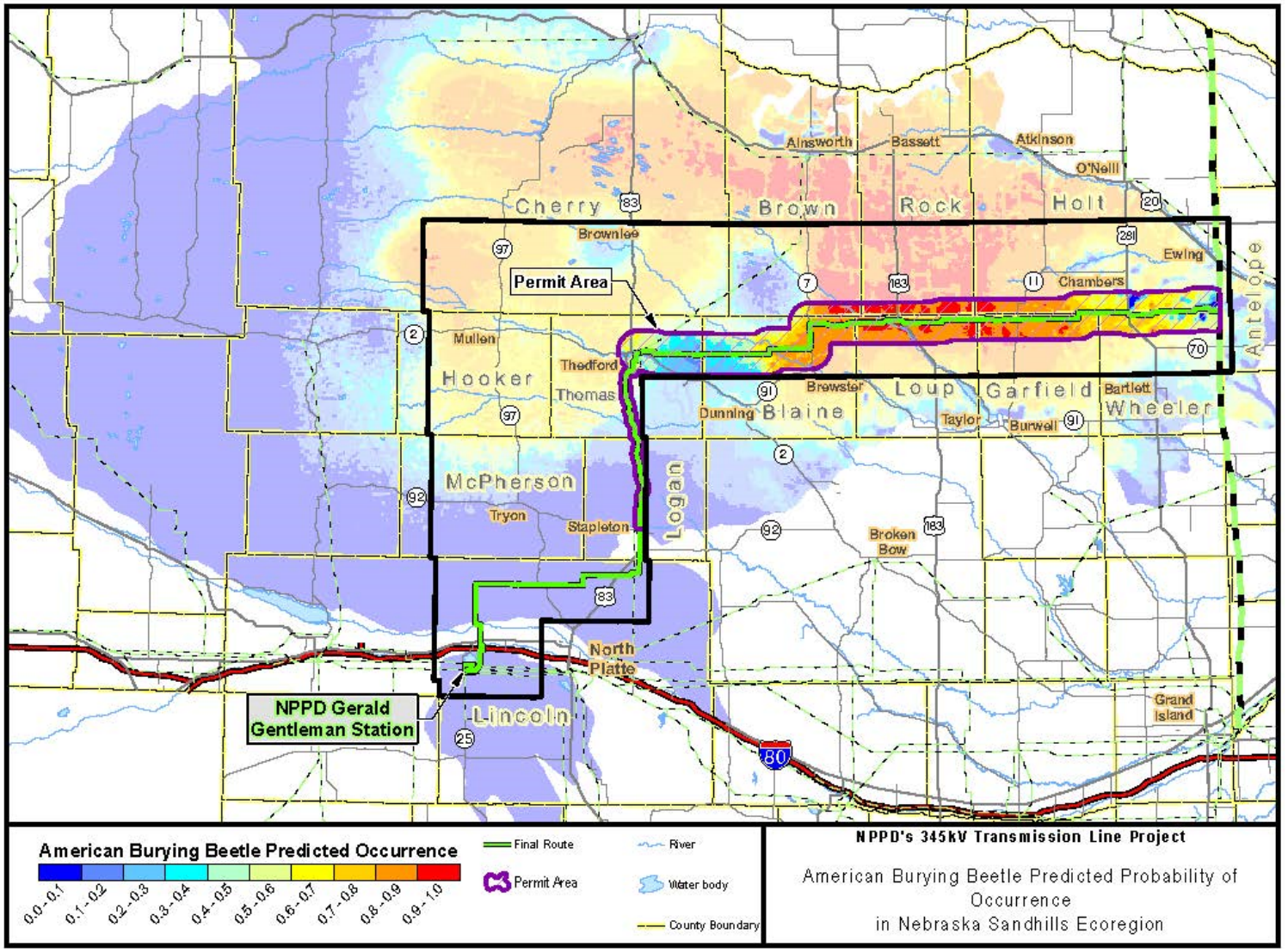
The information in FEIS Section 1.7, *NPPD's Need for the R-Project*, has been updated and is described in Revised HCP Section 1.2, *Purpose and Need*.

Figure 1-1. Nebraska Public Power District's R-Project Plan Area and Final Route



Source: NPPD 2023

Figure 1-2. Predicted Probability of American Burying Beetle Occurrence in the Nebraska Sand Hills Ecoregion



Source: NPPD 2023

1.8 Public and Agency Involvement

1.8.1 Supplemental Environmental Impact Statement Scoping Process

The Service conducted scoping for the SEIS, although scoping is not required for supplemental NEPA documents under CEQ regulations. On November 18, 2022, the Service published a Notice of Intent (NOI) in the FR to inform the public of its intent to prepare an SEIS to assess the impacts on the human environment related to the proposed issuance of the ITP and implementation of the Revised HCP (87 FR 69294). The NOI initiated a 30-day comment period for public review and comment on the SEIS. The NOI also announced that the Service would hold two virtual public meetings on December 8, 2022: one at 10:00 a.m. central standard time (CST) and one at 6:30 p.m. CST. Recordings of the public scoping meetings are available for viewing online (https://www.fws.gov/project/r-project-transmission-line) and at the North Platte Public Library (North Platte, Nebraska), Thomas County Library (Thedford, Nebraska), and Taylor Public Library (Taylor, Nebraska). The purpose of the public meetings was to provide the public with information on the proposed action and answer questions regarding the proposed action and overall NEPA process. Details on the public outreach, virtual meetings, and scoping comments can be found in Appendix A, *Scoping*.

1.8.2 Cooperating Agencies

Under CEQ regulations at 40 CFR 1501.8, as the lead federal agency for preparing the SEIS, the Service requested other agencies' participation in the NEPA process by distributing letters offering cooperating agency status, sent on August 25, 2022. Five entities accepted cooperating agency status: the National Park Service – National Trails, U.S. Environmental Protection Agency, U. S. Army Corps of Engineers, Nebraska Game and Parks Commission (NGPC), and History Nebraska. The cooperating agencies all have expertise related to the proposed action, and they may issue decisions concerning the R-Project and its potential environmental impacts.

1.9 U.S. Fish and Wildlife Service's Decisions and Related Actions

The information in FEIS Section 1.9, *U.S. Fish and Wildlife Service's Decisions and Related Actions*, has not changed and is incorporated by reference. In summary, the decision to be made by the Service is whether to issue an ITP to NPPD for the R-Project. The decision will be based on the statutory and regulatory issuance criteria for an ESA Section 10(a)(1)(B) permit (detailed in FEIS Sections 1.9.1, *Incidental Take Permit Application and Habitat Conservation Plan Submission Criteria*, and 1.9.2, *Incidental Take Permit Issuance Criteria*).

1.10 Structure of the Supplemental Environmental Impact Statement

This SEIS includes the following chapters.

- Chapter 1, *Purpose and Need*
- Chapter 2, *Alternatives*
- Chapter 3, *Affected Environment and Environmental Consequences*
- Chapter 4, *Cumulative Effects*
- Chapter 5, *Other Analyses Required by NEPA*
- Chapter 6, *Regulatory and Permit Requirements*
- Chapter 7, *Submitted Alternatives, Information, and Analysis*
- Chapter 8, *List of Preparers*

This SEIS does not include the following chapters that were included in the FEIS.

- Chapter 7, *Agencies and Tribes Contacted*. Including this information in an EIS is no longer a requirement in the CEQ regulations, which have been revised since the publication of the FEIS.
- Chapter 8, *Distribution List.* Including this information in an EIS is no longer a requirement in the CEQ regulations, which have been revised since the publication of the FEIS.
- Chapter 9, *References*. The references for this SEIS are included as Appendix A, *References,* as CEQ Regulations do not include references in the recommended format of an EIS (40 CFR 1502.10).

Chapter 2
Alternatives

The alternatives have been modified from the information presented in FEIS Chapter 2, *Alternatives*. This chapter describes the process that the Service used to determine the alternatives considered in this SEIS, describes the alternatives that are evaluated in detail in this SEIS, and briefly discusses the reasons that the Service eliminated alternatives from detailed study in the SEIS.

2.1 Approach to Alternatives

In addition to analyzing the proposed action and no action alternative, the Service is required to evaluate reasonable alternatives as defined by CEQ regulations (40 CFR 1508.1(z))[1] and the Department of Interior (DOI) NEPA regulations (43 CFR 46.420(b))[2]. FEIS Section 2.1, *Approach to Alternatives*, describes the development, study, and description of alternatives to the proposed action for the FEIS and is incorporated into this SEIS by reference.

As part of preparing the SEIS, the Service identified alternatives to the proposed action not addressed in the FEIS through considering the outcomes of the court decision and comments received during scoping, input from cooperating agencies, and input from NPPD. The Service then screened these potential alternatives to eliminate some from detailed study. SEIS Section 2.7, *Alternatives Eliminated from Detailed Study*, provides a summary of the outcomes of this screening process. Chapter 7, *Submitted Alternatives, Information, and Analyses*, provides a summary of the alternatives submitted during scoping. Appendix B, *Scoping Summary*, provides a summary of the comments received during scoping. The full contents of all scoping comments are available on Regulations.gov at https://www.regulations.gov/document/FWS-R6-ES-2014-0048-0202.

2.2 NPPD Process for Selecting Its Final Route

The information in FEIS Section 2.2, *NPPD Process for Selecting Its Final Route*, is largely unchanged and is incorporated into this SEIS by reference. This section of the FEIS describes NPPD's process for selecting its final route. To supplement the FEIS and provide more transparency and detail about route selection, the Service requested that NPPD summarize the process for selecting the final route (Appendix C, *Nebraska Public Power District Summary of the Power Review Board and Transmission Line Routing Process*).

In response to the court's June 2020 remand decision, which stated that the Service violated the National Historic Preservation Act by not considering other routing alternatives around O'Fallon's Bluff site, a historic property associated with remnant segments of the Oregon-California National Historic Trails that is listed in the National Register of Historic Places (NRHP), NPPD investigated whether it could undertake a route adjustment that would avoid or minimize impacts on this site. The route analyzed in the FEIS had an overhead crossing of the remnant trail segments on the property that is immediately west of the registered O'Fallon's Bluff site, but no structures were

[1] Per CEQ regulations, *reasonable alternatives* means a reasonable range of alternatives that are technically and economically feasible, and meet the purpose and need for the proposed action (40 CFR 1508.1(z)).

[2] Per DOI regulations, *reasonable alternatives* means alternatives that are technically and economically practical or feasible and meet the purpose and need of the proposed action (43 C.F.R. 46.420(b)).

proposed to be placed on any trail segments. The route adjustment that NPPD has chosen to implement would shift a segment of the proposed transmission line approximately 0.5 mile east from its original location, which would eliminate the overhead crossing of the trail ruts located on or immediately west of the registered O'Fallon's Bluff site (Figure 2-1). It would also create additional physical separation between the transmission line and this historic site, in an attempt to minimize auditory and visual impacts. After the shift to the east, the transmission line would continue north/northwest and then west back to rejoin the original route. This route adjustment would add approximately 1.0 mile to the total length of the transmission line. NPPD no longer proposes the original route across the remnant trail segments, and the reroute is now part of NPPD's proposed route as described in SEIS Section 2.4, *Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)*. Any other changes to the original R-Project are also described in Section 2.4.

2.3 No Action Alternative

The information in FEIS Section 2.3, *No-Action Alternative*, has not changed and is incorporated by reference in this SEIS. In summary, under the no action alternative, the Service would not issue an incidental take permit (ITP) for the R-Project, NPPD would not implement the HCP, and the R-Project would not be constructed.

2.4 Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP; Preferred Alternative)

The proposed action, and the Service's preferred alternative, is the current R-Project and Revised HCP. The proposed action is largely similar to the 2018 proposed R-Project described in the FEIS and is incorporated by reference in this SEIS, with changes described herein.

FEIS Section 2.4, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, describes the 2018 proposed R-Project route; proposed transmission line structure types and foundations; conductors and associated hardware; overhead shield (ground) wires; minor additional hardware; substation design; communications system; proposed transmission line construction (e.g., surveying and staking, tree clearing, construction access); substation construction/expansion; site restoration; special construction practices (e.g., construction with helicopters, well relocation); operations and maintenance practices (e.g., transmission line inspection, emergency repairs); ITP covered activities; mitigation for impacts of take; and avoidance and minimization measures.

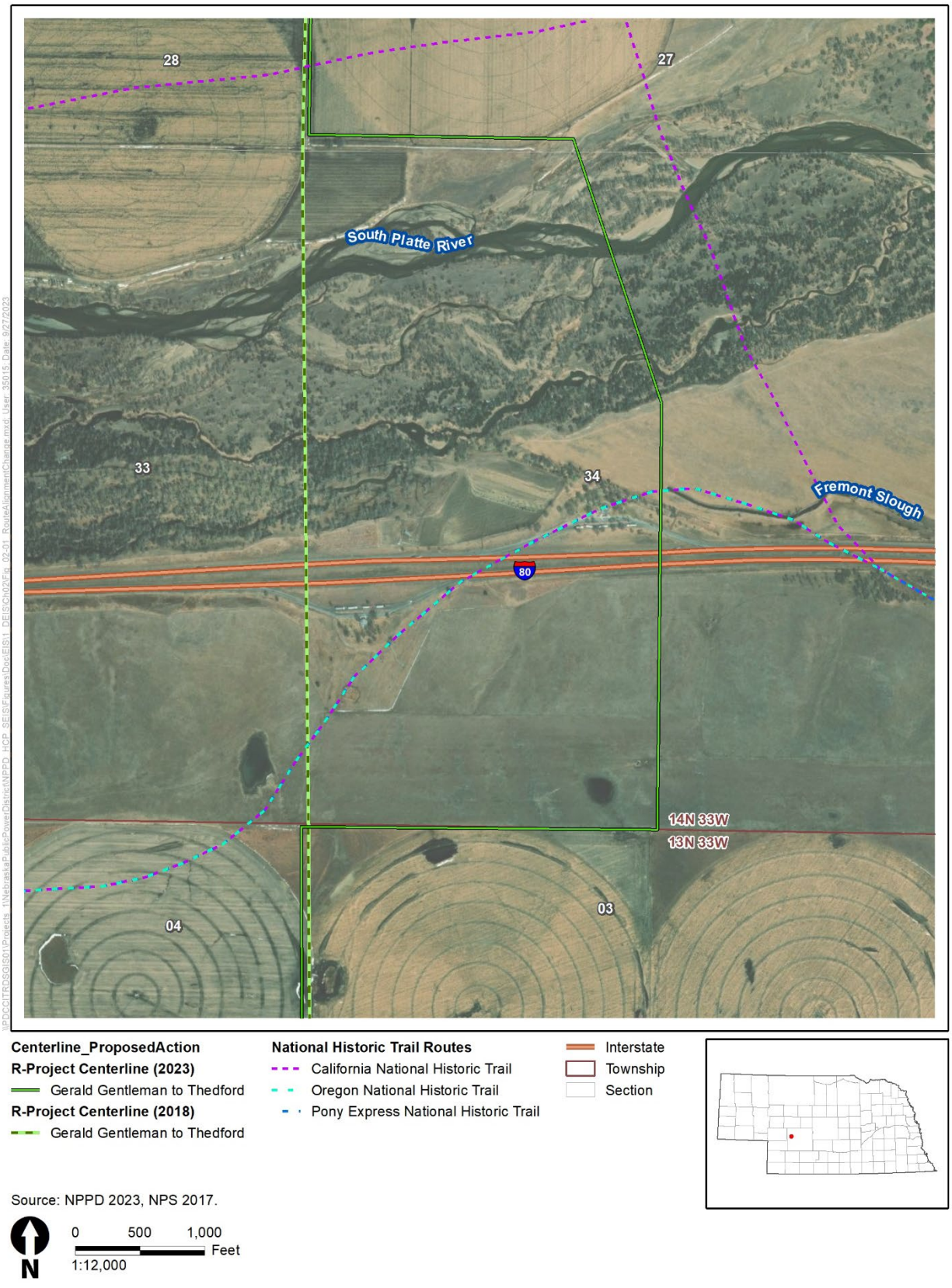


Figure 2-1. R-Project Transmission Line Route Adjustment Around O'Fallon's Bluff

Modifications and changes to the 2018 proposed R-Project include the following.

- The majority of the Holt County Substation has been removed from the R-Project and was constructed separate from the R-Project in May 2022. As such, the microwave communications link at the Holt County Substation described in FEIS Section 2.4., *Communications System*, is no longer part of the R-Project.
- As stated in SEIS Section 2.2, *NPPD Process for Selecting Its Final Route*, NPPD has made a route adjustment in the vicinity of O'Fallon's Bluff to reduce impacts on the Oregon-California National Historic Trail ruts. This route adjustment has resulted in an increase in the length of the proposed transmission line from 225 miles to 226 miles. This route adjustment is reflected in Figure 1-1 and Figure 2-1.
- NPPD has revised its treatment of construction access for purposes of covered activities under the Revised HCP. Rather than using three access scenarios and covering only two, all construction access is now treated as a covered activity in the Revised HCP (due to the possibility of crushing American burying beetle [ABB] [*Nicrophorus americanus*] buried in leaf litter on the surface) and is classified as either temporary or permanent. The overall amount of access needed for the R-Project has not changed, just its treatment in the Revised HCP. However, because overland travel that does not involve blading or grading is now included in the amount of disturbance from construction access, the total estimated temporary disturbance associated with construction access for the project has increased from 258 acres to 527 acres.
- NPPD added a new covered activity to the Revised HCP, referred to as a *construction contingency*, to account for the possibility that work may be required during construction that could not have been predicted. Examples of activities that would fall into this construction contingency include but are not limited to: relocation of an access route or work area developed for construction purposes that became flooded during the course of construction; unforeseen sensitive-resource discoveries; landowner changes to the existing land use that necessitate a change in the construction process; or NPPD's accommodation of landowner requests that result in minor changes in the construction process. NPPD would limit total disturbance from this covered activity to 40 acres.
- NPPD would mark the entirety of the R-Project with bird flight diverters to minimize bird collision risk, compared to NPPD's 2018 HCP, which only included marking of lines on segments with high risk for collisions.
- NPPD would mark 124 miles of its existing transmission lines with bird flight diverters. Existing lines that have the potential for marking include the 115 kV transmission line between Thedford Substation and the Ainsworth Substation, lines in the federally designated Whooping Crane Critical Habitat along the Platte River, and lines in Pearse et al. (2015) extended-use core intensity areas.
- NPPD modified the list of avoidance and minimization measures in the Revised HCP. The modifications include the following revisions to FEIS Section 2.4.16, *Avoidance and Minimization Measures*.
    - NPPD removed mowing and windrowing of vegetation, carrion removal, and use of low-ground-pressure equipment as avoidance and minimization measures in the Revised HCP. The Service no longer recommends mowing and carrion-removal efforts as avoidance and minimization measures (FWS 2022). The use of low-ground-pressure equipment is no

longer necessary due to the Revised HCP treating all construction access as a covered activity.

- NPPD revised the terminology "winter construction" to "non-active season construction" to more accurately reflect the relevant period for minimizing impacts on ABB.
- NPPD revised the terminology "sodium vapor lighting and downshield lighting" to "downshielded and low-temperature LED lighting at substations and temporary work areas, if necessary" to reflect the current preferred lighting type.

- In light of the changes in the treatment of construction access, the addition of the construction contingency, and the completion of certain construction activities on the R-Project under ITP #TE72710C-0, the Revised HCP includes an updated Table 2-1, which describes the HCP's covered activities.

2.5 Alternative A: 2018 Final EIS R-Project and HCP

Alternative A is the FEIS proposed R-Project and HCP, as described in FEIS Section 2.4, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and is incorporated in this SEIS by reference.

2.6 Alternative B: Tubular Steel Monopole Construction Only

Most of the information in FEIS Section 2.5, *Alternative B: Tubular Steel Monopole Construction Only*, has not changed and is incorporated in this SEIS by reference. Under Alternative B, the Service would issue an ITP for NPPD's current R-Project, and NPPD would implement the Revised HCP. Alternative B would use only tubular steel monopoles for all proposed transmission line towers, but otherwise, the R-Project would be the same as the proposed action, as described in SEIS Section 2.4, *Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)*.

2.7 Alternatives Eliminated from Detailed Study

This section describes the rationale for eliminating alternatives not carried forward for detailed study. The Service must briefly discuss in the SEIS the reasons why it eliminated certain alternatives from detailed study (40 CFR 1502.14). Table 2-1 provides a summary of all alternatives dismissed from detailed study.

2.7.1 FEIS Alternatives Eliminated from Detailed Study

FEIS Section 2.6, *Alternatives Considered and Eliminated from Further Consideration*, provides a rationale for the dismissal of seven alternatives from detailed study. The rationale for dismissing these alternatives from detailed study is incorporated by reference in this SEIS, except for two alternatives for which the Service sought an updated rationale (*Lattice Tower Structures Only* and *Underground Structures*). The rationale for eliminating these alternatives from detailed study is described in the following sections.

Table 2-1. Overview of Alternatives Considered but Dismissed from Detailed Study in the FEIS and SEIS

Alternative Considered but Eliminated	Rationale for Elimination
Non-active season construction (Winter Construction Only – FEIS Section 2.6.1)	• Not economically or technically feasible.
Lattice Tower Structures Only (FEIS Section 2.6.2, Updated SEIS Section 2.7.1.1)	• Not economically or technically feasible.
Capture and Relocation Conservation Measures (FEIS Section 2.6.4)	• Does not meet the Service's purpose and need to achieve long-term species and conservation objectives.
Construction that Avoids ABB Habitat and Does Not Require ITP (FEIS Section 2.6.4)	• Not economically or technically feasible.
Underground Construction (FEIS Section 2.6.5, Updated SEIS Section 2.7.1.2)	• Not economically or technically feasible.
Alternative Transmission Line Routes Outside of Approved Corridor: Northern Conceptual Route (FEIS Section 2.6.6.1)	• Not economically or technically feasible. • Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria.
Alternative Transmission Line Routes Outside of Approved Corridor: Southern Conceptual Route (FEIS Section 2.6.6.1)	• Not economically or technically feasible. • Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria.
Alternative Transmission Line Routes Outside of Approved Corridor: Central Conceptual Route (FEIS Section 2.6.6.1)	• Not economically or technically feasible. • Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria.
Alternative Transmission Line Routes Outside of Approved Corridor: Eastern Route Adjustment (FEIS Section 2.6.6.1)	• Not economically or technically feasible. • Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria.
Alternative Transmission Line Routes Outside of Approved Corridor: Western Route Adjustment (FEIS Section 2.6.6.1)	• Not economically or technically feasible. • Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria.
Reroute to Avoid/Minimize Effects on Historic Trail and Archaeological Site (SEIS Section 2.7.2.1)	• Not economically or technically feasible.
Reroute to Avoid/Minimize Effects on Historic Property – St. John's Church (SEIS Section 2.7.2.1)	• Not economically or technically feasible.
Reroute to Avoid/Minimize Effects on Historic Property – Historic Ranch (SEIS Section 2.7.2.1)	• Not economically or technically feasible.
Reroute to Avoid/Minimize effects on a Conservation Easement (SEIS Section 2.7.2.2)	• Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria or to achieve long-term species and conservation objectives.
Application Ultraviolet Light-Based Avian Collision Avoidance Systems (SEIS Section 2.7.2.3)	• Does not meet the Service's purpose and need of Section 10 permit application evaluation based on permit issuance criteria.

2.7.1.1 Lattice Tower Structure Only

Under this alternative, NPPD would construct the R-Project using only lattice tower structures installed using helical pier foundations. The FEIS assumed that installation would use helicopter erection and that temporary disturbance would be reduced compared to steel monopole installation because of the smaller work area required.

Per updated input from NPPD, the use of helicopters to this extent would be economically infeasible; therefore, cranes would likely be used to set lattice towers in this scenario. Construction of steel lattice towers using cranes would require the same work area for each tower as steel monopole towers (approximately a 200-by-200-foot area). Even if helicopters were used to assemble all lattice towers, the reduction of workspace required at the structure locations would likely be mostly or totally offset by the need for additional fly yards located approximately every 5 miles along the route. Therefore, there would not be a reduction in impacts on ABB compared to the proposed action.

2.7.1.2 Underground Construction

Under this alternative, NPPD would construct portions of the R-Project line underground to reduce potential impacts on migratory birds. As described in the FEIS Section 2.6.5, *Underground Construction*, high-voltage underground transmission lines (345 kilovolts and above) have markedly different technological requirements and are more difficult to place underground than lower voltage underground distribution lines, which provide electricity to individual homes and businesses. Recent cost estimates developed for underground construction per-mile for an underground single conductor per phase system have increased from $20,000,000, as noted in FEIS Section 2.6.5, *Underground Construction*, to $35,000,000 per mile (NPPD 2023). For the R-Project, three phase systems would be required per line segment, resulting in a cost of between $60,000,000 and $105,000,000 per mile. Estimated costs represent a multiplier of 15 to 20 times more than the cost of an overhead transmission line, which is consistent with the estimates provided in FEIS Section 2.6.5.

Additionally, the installation of the underground cable or duct banks and access vaults and construction of transition stations required to bury the line would result in greater costs associated with land acquisition and more temporary and permanent impacts related to ground disturbance.

For these reasons, underground construction would be economically infeasible.

2.7.2 Other Alternatives Considered but Eliminated from Detailed Study

The following alternatives identified based on the outcomes of the court decision, comments received during scoping, input from cooperating agencies, and input from NPPD,[3] were considered but dismissed from detailed analysis from the SEIS for the reasons summarized below. Table 2-1 provides a summary of all alternatives dismissed from detailed study.

[3] See Appendix D for NPPD's feedback on the technical and economic feasibility of potential alternatives.

2.7.2.1 Alternatives Evaluated to Minimize/Avoid Effects on Historic Properties

Based on the outcomes of the court decision, the Service reviewed the historic properties (as defined by the National Historic Preservation Act) identified to have potential adverse effects to determine whether reasonable alternatives within NPPD's approved routing corridor existed that would avoid or minimize effects. Two of the properties identified in the FEIS (Old Highway 83/U.S. Route Segment and the Paxton-Hershey Canal) were not considered in this alternatives screening process because the Section 106 of the National Historic Preservation Act Programmatic Agreement executed for the R-Project in 2019 identified that there would not be adverse effects on these historic properties. Additionally, the Sutherland State Aid Bridge is going to be demolished and replaced (Haws 2023), meaning that there is no need to consider an alternative that avoids/minimizes effects on this historic property.

Reroute to Avoid/Minimize Effects on Historic Trails and Archaeological Site

This alternative would reroute the R-Project to avoid the O'Fallon's Bluff site, which is listed in the NRHP (undefined criteria),[4] the Mormon Pioneer Trail's Sand Hill Ruts Site, which is eligible for listing under Criterion A in the NRHP, and Archaeological Site 25LN113, which is potentially eligible for listing under Criterion D in the NRHP, all of which are geographically close to one another and, therefore, were considered together. The National Park Service National Trails Office (NPS Trails) suggested that to avoid and minimize effects on O'Fallon's Bluff and the Sand Hill Ruts sites, the proposed transmission line route should be moved to the far eastern boundary of the routing corridor, as far from these known sites as possible. NPS Trails also suggested that crossing National Historic Trails minimally and in a perpendicular manner and avoiding high potential sites and trail features, such as ruts, are ways to reduce effects.

As shown in Appendix D, *NPPD Input on Alternatives Development*, NPPD evaluated multiple routes in the Power Review Board routing corridor that would avoid these resources, including increasing the route's distance from O'Fallon's Bluff, historic trails, and an archeological site. These routes were found to be technically or economically infeasible because they introduce some or all of the following conflicts.

- The route would parallel existing transmission lines for longer distances than the proposed R-Project route, increasing the chances of an event impacting multiple lines, thus reducing the redundancy and, ultimately, the reliability of NPPD's system.
- The route would require a stream crossing over the South Platte River that would be further from existing infrastructure than the stream crossing in the proposed R-Project route. This would require the removal of substantially more trees than the proposed route and would not align with the recommended minimization measure to place stream crossings where existing infrastructure (e.g., bridges) is already present to minimize impacts on waterfowl.
- The route would be closer to more homes and other buildings, increasing human impacts and safety concerns compared to the proposed route. These safety concerns could also result in increased project costs due to the liability of siting the line close to residences. There are additional technical constraints on route maintenance in proximity to homes and other

[4] O'Fallon's Bluff is listed in the National Register of Historic Places but has not been associated with a specific listing criterion because it was listed prior to the development of specific listing criteria.

structures, and liabilities related to proximity to landowners' property (e.g., outbuildings and cattle yards).

- The route would introduce a center-pivot irrigation system conflict and result in operational constraints for adjacent landowners, as these systems cannot operate with a transmission line structure in the way. This would also introduce safety concerns for landowners and related liability for NPPD, should the transmission line be sited close to their property and fall on their center-pivot infrastructure in an emergency.
- The route would require relocation of a cell tower, which would substantially increase project costs due to the high cost of relocating these structures. This would also increase the liability associated with operation and maintenance of a transmission line near cell towers (e.g., operational interruptions if a cell tower were to fall onto the transmission line; safety concerns for transmission line maintenance personnel).

For these reasons, this alternative was eliminated from detailed study in the SEIS.

Reroute to Avoid/Minimize Effects on Historic Property – St. John's Church

This alternative would reroute the R-Project a greater distance from St. John's Church, which is eligible for listing under Criterion C in the NRHP. The church and associated parsonage are located approximately 285 feet west of the proposed R-Project centerline, along Highway 7 to the north of Brewster, Nebraska.

As shown in Appendix D, NPPD evaluated two routes in the Power Review Board routing corridor that would avoid this historic property (one that would shift the R-Project line to the west and one that would shift the R-Project line to the east). Either adjustment would move the route away from the highway, which would decrease the overall benefits of paralleling the highway and result in increased impacts (including more take of ABB) from moving the line into undeveloped areas, conflicting with the Service's purpose and need.

Both reroutes evaluated by NPPD were found to be technically or economically infeasible because of the following conflicts:

- The route would require installing two additional 90-degree turns with large self-supporting structures, which would result in greater overall visual impact and increase project costs. The alternative route to the west of the proposed route would introduce a center-pivot conflict.
- The alternative route 1 mile to the east would involve coordination with a new landowner, be located within 600 feet of a home, have one potential center-pivot conflict, and cross over a feedlot.

For these reasons, this alternative was eliminated from detailed study in the SEIS.

Reroute to Avoid/Minimize Effects on Historic Property – Historic Ranch

This alternative would reroute the R-Project a greater distance from the historic ranch site located approximately 1.75 miles north of Stapleton and 713 feet from the 2018 R-project final route near Stapleton, Nebraska. This resource is potentially eligible for listing under NHPA Criteria A and C (36 CFR 60.4). The 2018 FEIS identified long-term, moderate- to high-intensity adverse indirect visual effects on this property.

As shown in Appendix D, NPPD evaluated a route in the Power Review Board routing corridor that would avoid this historic property (shifting the line one mile east of the final line route, then one mile north, then back one mile west back to NPPD's final line route to provide further separation from the ranch home). This would move the route away from the highway, which would decrease the overall benefits of paralleling the highway and result in increased impacts (including more take of ABB) from moving the line into undeveloped areas, conflicting with the Service's purpose and need.

This route was found to be technically and economically infeasible because of the following conflicts.

- Increased project construction costs associated with the turns and distance added to the route.
- It would require installing 13 structures on the ranch property compared to the four structures required to follow Highway 83, including four large self-supporting structures required for 90 degree turns.

Moving the line west would result in the same impacts as routing east of Highway 83 and could also result in reduced line reliability due to proximity to an existing 115-kilovolt transmission line running north to south one mile west of the ranch property.

For these reasons, this alternative was eliminated from detailed study in the SEIS.

2.7.2.2 Reroute to Avoid/Minimize Effects on a Conservation Easement

Based on comments received during scoping, the Service considered an alternative to avoid or minimize effects on a conservation easement on the Horseshoe Bar Ranch that is held by the Nebraska Land Trust as of February 2023. The R-Project line would cross the property near its crossing of the Dismal River along U.S. Highway 83. The easement is being acquired through the Natural Resources Conservation Service Agricultural Easement Program and has qualified for the Grasslands of Special Environmental Significance section of the program.

This alternative would not meet the purpose and need because it would require the Service to act outside of its authority under Section 10(a)(1)(B) and (2)(B) of the ESA, the latter of which states that the Service "shall issue" the permit if the permit application, including the Revised HCP, meets all the permit issuance criteria, which includes other Section 10 and general permit requirements of the Service's regulations. Although the Service may recommend NPPD consider route modifications during the planning process, it does not have authority to require NPPD to alter the proposed route or select a different one if the permit application meets all the permit issuance criteria. Additionally, rerouting the R-Project to avoid or minimize effects on this conservation easement would require shifting the line away from the existing highway in this location and into undeveloped land, which would increase impacts on species, further conflicting with the Service's purpose and need. For these reasons, this alternative was eliminated from detailed study in the SEIS.

2.7.2.3 Application Ultraviolet Light-Based Avian Collision Avoidance Systems

The Service evaluated the potential for an alternative that would include the application of a new ultraviolet-light-based Avian Collision Avoidance Systems to the R-Project to avoid or minimize risk of whooping crane collision. A specific suggestion raised in a scoping comment was to apply

ultraviolet-light-based Avian Collision Avoidance Systems where the R-Project traverses wetlands within the 95th percentile migration corridor for whooping crane.

This alternative would not meet the purpose and need because take of whooping crane has not been determined to be reasonably certain to occur, and NPPD has not included it in the HCP and associated ITP application. Therefore, this alternative does not meet the Service's purpose and need to respond to NPPD's existing application requesting authorization of incidental take of only ABB.

Additionally, the technology recommended by the commenter is not developed to a point where it can be reliably and cost effectively used for transmission lines, therefore, this alternative is not technically or economically feasible. Studies of this technology have been implemented only in limited scenarios for short periods of time and have shown that this technology requires frequent monitoring and maintenance to ensure that it is properly functioning (Dwyer et al. 2019; Baasch et al. 2022). These studies do not indicate that it would be feasible to install such a system on all wetlands traversed by the R-Project line (all of which occur in the 95th percentile migration corridor for whooping crane).

Chapter 3
Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the existing environmental resources and the potential effects that the alternatives described in Chapter 2 would have on those resources. As described in Chapter 1, this is a supplemental analysis, and the FEIS is incorporated by reference where applicable. Therefore, the structure and contents of this chapter have been modified from the FEIS. Additionally, figures and tables have been updated as necessary to explain changes to the affected environment or environmental consequences.

Since publication of the FEIS, changes have occurred, as summarized here in the introduction to Chapter 3. These changes are taken into consideration in the affected environment and environmental consequences in the resource sections of Chapter 3 (SEIS Sections 3.2 to 3.18).

3.1.1 Summary of Activities Implemented Since FEIS Publication

As described in SEIS Chapter 1, the Service issued an incidental take permit (ITP) to NPPD in 2019 based on the original FEIS, Record of Decision, and ITP application. NPPD undertook some construction activities before the ITP was vacated by the court remand. Table 3.1-1 summarizes the R-Project activities conducted under that ITP.

Table 3.1-1. R-Project Activities Conducted before the Court Remand

Activity	Additional Detail
Right-of-way (ROW) acquisition and surveying and staking activities on properties with signed ROW easements	• This staking was accomplished via use of light vehicles and all-terrain vehicles. • This work did not result in any measurable disturbance.
Relocation of 19 miles of distribution lines	• Overhead distribution power-line relocation activities were completed almost entirely from adjacent existing roadways, with a few moves completed from a bucket truck in the distribution ROW near Stapleton. Distribution line underground installations were completed using a horizontal boring or knifing via a small plow that did not side-cast spoils or require any restoration activities. Thus, overhead and underground installations did not result in any measurable temporary disturbance and did not require any restoration activities. • New distribution pole locations resulted in 0.07 acre of permanent disturbance and 0.2 acre of temporary disturbance.

Activity	Additional Detail
Establishment of temporary access	• 3.44 acres of temporary access was established via the placement of construction matting. • Matting has been removed and area has been restored with native plant species.
Establishment of 16 fly yards/assembly areas	• Only a small portion of these fly yards/assembly areas were used. • Construction matting was placed on 4.73 acres but has since been removed and the areas have been revegetated with native plant species. • Cattle-exclusion fencing was installed at three of these fly yards/assembly areas and remain in place.
Establishment of four construction yards/staging areas	• Only a small portion of these construction yards/staging areas were used. • Construction matting and material storage affected approximately 11.5 acres, with the construction materials still being stored at those construction yards/staging areas. • Cattle-exclusion fencing was installed at two of these three construction yards/staging areas and remains in place.
Installation of gates in existing fences	• Gates were installed in existing ranch fences along planned construction access. • Installation involved placement of four supported fence posts with the wire gate strung in between.
Tree clearing	• NPPD cleared approximately 6.9 acres of trees. • Tree clearing occurred between September and May. • All trees were cut, and any stump removal was done by grinding.
Substation work and construction at the existing GGS substation, which totaled approximately 0.03 acre of new surface disturbance	• Removal of a portion of existing perimeter fence. • Installation of rock over expansion area. • Installation of an oil-containment structure. • Installation of concrete reactor pad foundation, ground grid, and conduit. • Delivery and installation of reactor. • Installation of control cable for monitoring reactor. • Delivery and staging of steel poles and other miscellaneous parts and supplies for future installation. • Installation of perimeter chain link fence around the expansion area.
Substation work and construction at the expanded Thedford Substation, which resulted in 13 acres of permanent disturbance	• Survey work and geotechnical sample drillings. • Grubbing and reshaping the grade to form a relatively flat working surface. • Construction of permanent all-weather access. • Erection of an eight-foot-tall permanent chain link fence around the perimeter of the substation. • Compaction of excavated and fill areas. • Installation of oil-containment structures. • Installation of foundations, the ground grid, transformers, reactors, and the control building. • Placement of crushed-rock surface on the subgrade.
Purchase of fee title of 594 acres of mitigation lands	Purchase of fee title occurred in Blaine County, Nebraska.

Source: NPPD 2022

3.1.2 Summary of Changes in Disturbance Areas

Table 3.1-2 compares the estimated amount of temporary and permanent disturbance between the proposed action, Alternative A, and Alternative B. Revised HCP Chapter 2 details the types of temporary and permanent disturbance that would occur during construction and operation of the R-Project. Temporary disturbance includes disturbance from construction activities in areas that would be revegetated or returned to natural conditions following construction of the R-Project (generally within five years). Permanent disturbance would be present throughout R-Project operation. As described in SEIS Chapter 2, since publication of the FEIS and the court remand, the proposed action has been revised to include a route adjustment intended to reduce impacts on O'Fallon's Bluff, which results in modifications to the estimated temporary and permanent disturbance areas. In addition to the route adjustment, the addition of a 40-acre construction contingency and the addition of overland travel for construction access as a covered activity in the Revised HCP have implications for the estimated amount of disturbance.

Table 3.1-2. Estimated Disturbance Areas for Proposed Action, Alternative A, and Alternative B (acres)

	Proposed Action		Alternative A, FEIS Proposed Action		Alternative B: Steel Monopole Alternative, 2023 Proposed Route	
	Temporary	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**
Construction						
Access						
Temporary Access	527	--	258		944	--
Permanent Access	--	26[a]		26	--	26[a]
ROW Preparation						
ROW Tree Clearing [b]	42.1[c]		49	--	42.1[c]	--
Temporary Work Areas						
Fly Yards/Assembly Areas	279	--	193	--	0	--
Construction Yards/Staging Areas	96.5[d]	--	203	--	107.9	--
Pulling and Tensioning Sites	359	--	275	--	440.7	--
Temporary Structure Work Areas						
Lattice Tower	137	--	175	--	0	--
Steel Monopole	262	--	311	--	787.7	--
Structure Foundation Excavation/Installation						
Helical piers – lattice tower	--	0.9	--	0.82	--	0
Standard foundation – steel monopole	--	0.4	--	0.35	--	0.9
Construction Contingency						
Construction contingency	40		--	--	53.2	--

	Proposed Action		Alternative A, FEIS Proposed Action		Alternative B: Steel Monopole Alternative, 2023 Proposed Route	
	Temporary	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**
Distribution Power-Line Relocation						
Distribution power-line relocation	13.6[e]	0.02[e]	43	0.09	13.6[e]	0.02[e]
Well Relocation						
Well relocation	0.4	--	0.4	--	0.4	--
Substations						
Thedford	--	--	--	12	--	--
Holt County	--	--	--	13	--	--
Construction Subtotal	**1,756.6**	**27.3**	**1,507.4**	**52.26**	**2,389.7**	**26.92**
Operation and Maintenance [f]						
Emergency Repairs [f]	**351**	**--**	**301**	**--**	478	--
TOTAL	**2,107.6**	**27.3**	**1,808.4**	**52.26**	**2,867.6**	**26.92**

Source: NPPD 2023a

[a] Temporary access routes may be left in place following completion of construction depending on landowner requests and requirements for operation and maintenance of the line. These routes would then be classified as permanent access and represent a permanent impact. No more than 26 acres of permanent access will be left in place following construction.

[b] Trees will not be allowed to regrow in ROW. ROW will be converted to grassland.

[c] This does not include approximately 6.9 acres of trees that were cleared when ITP #TE72710C-0 was in effect.

[d] This does not include approximately 11.5 acres of construction yards/staging areas that were put in place when ITP #TE72710C-0 was in effect.

[e] This does not include approximately 29.4 acres of temporary disturbance originally estimated for distribution power-line relocations in the Permit Area when ITP #TE72710C-0 was in effect. The relocation efforts were able to be conducted with minimal impacts.

[f] Disturbance from emergency repairs is estimated at 20% of the remaining construction subtotal. Disturbed areas would be restored if conditions require restoration efforts.

3.1.3 Related Renewable Energy Projects

This section describes related renewable energy projects, which are considered in the resource sections of this SEIS as indirect effects of the proposed action and alternatives. Table 3.1-3 provides a summary of the projects the Service has determined to be both reasonably foreseeable and related to the R-Project (40 CFR 1501.9(e)), and therefore should be analyzed as indirect effects of the proposed action. These projects are referred to throughout this document as "related renewable energy projects."

Although the FEIS analyzed future renewable energy projects in the context of potential cumulative effects, the court decision (described in SEIS Chapter 1) stated that the Service "should have treated wind power development as an indirect effect of granting an incidental take permit to the Power District, not a cumulative effect" because a stated purpose of the R-Project was to provide renewable energy generation projects connection to the grid and, therefore, the R-Project makes renewable energy project more probable (*Oregon-California Trails Association v. Walsh*, 1:19-cv-01945-WJM, D. Colo 2020, p. 72). The Thunderhead Wind

Energy Center (Thunderhead) was a specific project that was analyzed as a cumulative impact in the FEIS, and is therefore related to the Court's decision on the FEIS. Since publication of the FEIS, Thunderhead was constructed and it is currently operational[1]. Although Thunderhead is no longer a future related renewable energy project like the others described in this section, it is considered a related renewable energy project in the analysis of indirect effects in this SEIS. The approach to analyzing the impacts of Thunderhead is described in SEIS Section 3.1.4.2.

The other related renewable energy projects will connect directly to the R-Project or identify the R-Project as a contingent facility.[2] Table 3.1-3 presents the best available information for these projects; however, the level of detailed information for each project is incomplete or unavailable in some cases (40 CFR 1502.21). SEIS Section 3.1.4.2 describes the approach to analyzing the impacts of these projects.

Additional past, present, and future renewable energy projects that are not related to the R-Project but are in the R-Project study area (SEIS Section 3.1.4.1), are described in Chapter 4, *Cumulative Effects*.

Table 3.1-3. Related Renewable Energy Projects

Project Name (Generator Type)	County[a]	Capacity[a] (MW)	Approximate Footprint	Number of Turbines	Expected Date Active[a]
Prairie Hills Wind (Wind)[d]	Custer	200	N/A	35–70 (89 maximum)[d]	6/1/2026 (commercial operation)
Uncertain (Wind)	Holt	50	N/A	Unknown	Unknown
Sidney Solar (Solar)[b]	Cheyenne	40	320[c]	N/A	Unknown
Steeple Wind Energy (Wind)[c]	Holt	200	N/A	Unknown	1/1/2028
Big Blue Nebraska (Wind)[c]	Jefferson	300	N/A	90 maximum[e]	Unknown
Big Blue II (Wind)[c]	Jefferson	128	N/A	Unknown	Unknown
K-Junction Solar (Solar)[c]	York	310	2,800[f]	N/A	2027[f]
Greeley Wind Nebraska (Wind)[c]	Greeley	115	N/A	<100[g]	Unknown
Thunderhead Wind Energy Center (Wind)[h]	Antelope, Wheeler, Holt	300	68[i]	108	Active

[a] Information in this column was described in NPPD's *Summary of Future Generation Projects Relevant to the R-Project.*
[b] Sandhills Energy 2023
[c] Jenniges 2023, pers. comm.
[d] Higgins 2021

[1]For the Thunderhead Wind Energy (Thunderhead) project to connect to the Western Area Power Administration (WAPA) transmission system, a NEPA analysis was required. WAPA prepared an Environmental Assessment analyzing the construction of the interconnection facilities and the operation of the Thunderhead project for 50 years, available at https://www.wapa.gov/wp-content/uploads/2023/04/Thunderhead_Final_EA.pdf.
[2] Contingent facilities to a proposed renewable energy project are defined as unbuilt Interconnection Facilities and Network Upgrades upon which that project's Interconnection Request's costs, timing, and study findings are dependent, and if delayed or not built, could cause a need for restudies of the Interconnection Request or a reassessment of the Interconnection Facilities, Network Upgrades, and costs and timing (NPPD 2023b).

[e] NextEra Wind Energy 2023
[f] Omaha Public Power District 2023
[g] Source information is FWS project files, approximations are used to protect confidential business information.
[h] SWCA Environmental Consultants 2022
[i] Estimated area of permanent disturbance provided in the Environmental Assessment for Thunderhead (SWCA Environmental Consultants 2022)

3.1.4 Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation

3.1.4.1 Affected Environment

FEIS Section 3.1.1, *Affected Environment*, is incorporated into the SEIS by reference, with differences noted below.

The FEIS R-Project study area (FEIS Figure 3.1-1) is incorporated by reference in this SEIS. This study area is a 7,039 square-mile (4,504,906-acre) area in Lincoln, McPherson, Logan, Hooker, Thomas, Cherry, Brown, Blaine, Rock, Loup, Garfield, Antelope, and Wheeler Counties. This study area was developed by NPPD during its routing process and adopted by the Service for purposes of defining baseline conditions in the FEIS.

The FEIS project area is incorporated by reference in this SEIS and is used to analyze effects from the proposed action and alternatives. The project area is based on the specific components of the R-Project (proposed transmission line, access roads, and work areas) and therefore has changed relative to the FEIS. Any relevant changes to the FEIS project area are addressed in the affected environment in the SEIS resource sections. The R-Project activities conducted between June 2019 and June 2020, summarized in Table 3.1-1, are considered baseline conditions and are part of the affected environment.

FEIS Table 3.1-1 describes the study area and analysis area for each resource topic in the FEIS and is incorporated by reference into this SEIS. For most resource areas, the study area is the same in the SEIS for the proposed action and alternatives. If the study area for the proposed action and alternatives has not changed since the FEIS, it is not discussed in the resource sections in Chapter 3. If the study area has changed, it is described in the resource sections in Chapter 3.

For the SEIS resource sections, the related renewable energy projects study area includes the counties which contain related renewable energy projects: Holt, Cheyenne, Jefferson, York, and Greeley (Figure 3.1-1). The study area also includes proposed or existing project areas, where available (Figure 3.1-1). This includes the proposed Prairie Hills Wind project area (Custer County; 40,965 acres), proposed Big Blue Nebraska project area (Jefferson County; 20,544 acres), and the Thunderhead project area (Holt, Antelope, and Wheeler Counties; 60,889 acres). These project areas are broad and include all sections where project facilities could be constructed. The exact footprint required for facilities for the proposed Prairie Hills Wind and Big Blue Nebraska projects is not known but is expected to comprise a small percentage of the total project areas. Approximately 70 acres of permanent land disturbance was estimated for Thunderhead, which was constructed and is currently operational, and thus is considered part of baseline conditions and the affected environment.

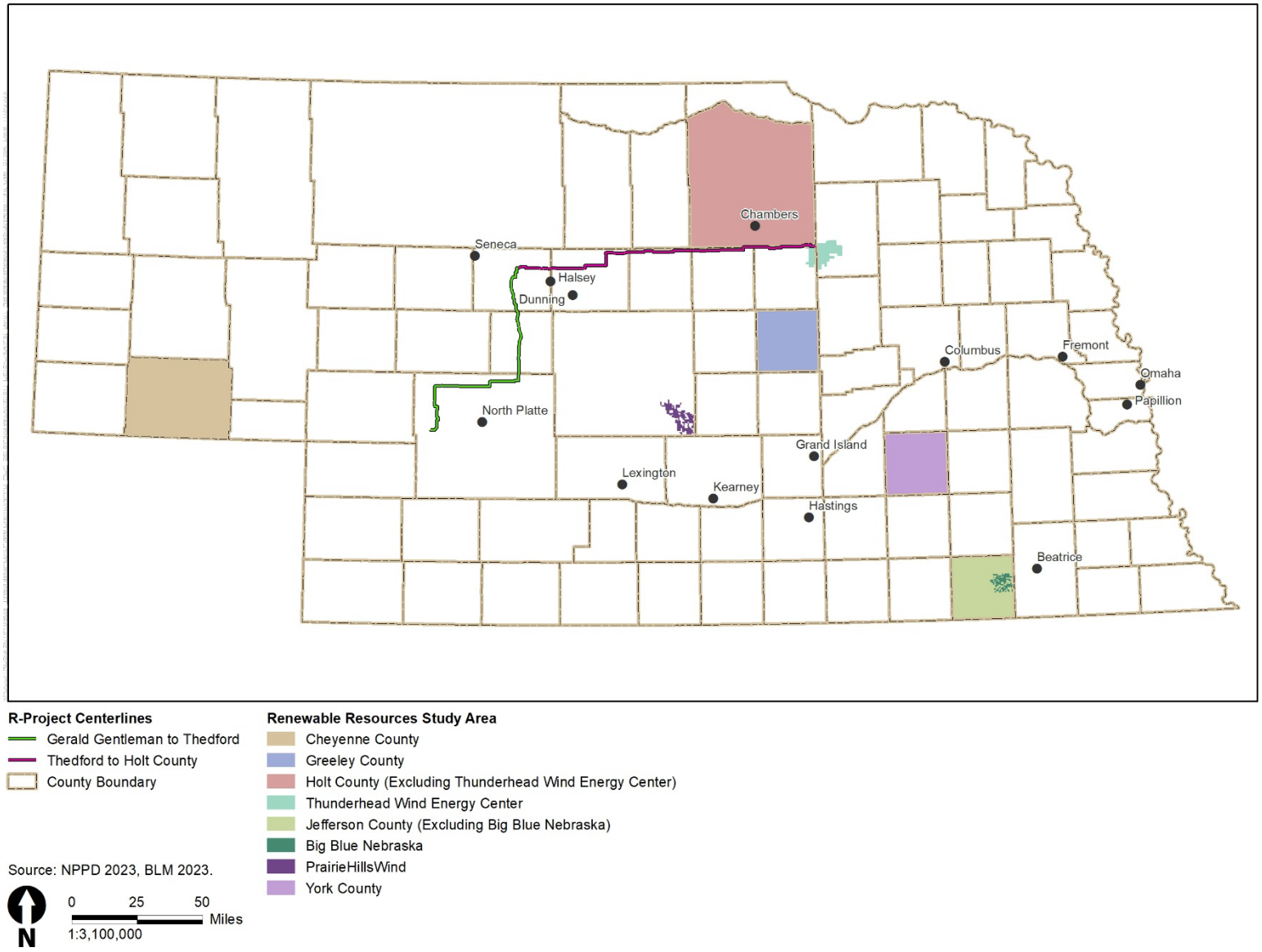


Figure 3.1-1. Related Renewable Energy Projects Study Area

3.1.4.2 Environmental Effects

FEIS Section 3.1.2, *Environmental Effects*, is incorporated by reference, with differences noted here.

As shown in Table 3.1-2, the total estimated temporary disturbance area is greater by approximately 300 acres or 16.5% for the current proposed action than what was estimated in the FEIS for the FEIS proposed action. While this change would result in nominally different effects for some resources, it would not change the overall conclusions of the intensity of impacts discussed in the FEIS.

The FEIS included avoidance and minimization measures (AMMs) in a separate subsection of each Chapter 3 resource section. In this SEIS, AMMs are not included as a separate section in the resource topic sections. The Revised HCP's AMMs apply to the proposed action and Alternative B, and a detailed description of the AMMs can be found in the Revised HCP itself. AMMs from the 2018 HCP would apply to Alternative A and are incorporated by reference for that alternative. The related renewable energy projects are not covered activities subject to the HCP AMMs, and the geographic area of these projects extends beyond the study area for the proposed action and alternatives.

As described in the FEIS, the conclusions for the SEIS impact analyses use the following terminology to describe the potential impacts of the proposed action and alternatives: short term, long term, low intensity, moderate intensity, and high intensity. FEIS Table 3.1-2 defines these terms in the context of each resource topic and is incorporated by reference into this SEIS.

FEIS Table 3.1-3, which compares the design characteristics of the proposed action and alternatives, has been updated for the SEIS (Table 3.1-4).

Table 3.1-4. Design Characteristics Comparison

Component	Proposed Action	Alternative A: FEIS Proposed Action	Alternative B: Steel Monopole Alternative, 2023 Proposed Route
Line length	226 miles	225 miles	226 miles
Structure type	Steel monopole and steel lattice tower	Steel monopole and steel lattice tower	Steel monopole
Structure height	Steel monopole – 120 to 175 feet Steel lattice tower – 90 to 155 feet	Steel monopole – 120 to 175 feet Steel lattice tower – 90 to 155 feet	Steel monopole – 120 to 185 feet
Span length	1350 feet	1350 feet	1350 feet
Number of structures per mile	4.2	4.2	4.2
ROW width	200 feet	200 feet	200 feet

Source: NPPD 2018; NPPD 2023a

FEIS Table 3.1-4 is incorporated by reference into this SEIS, where the description of activities is the same but the changes in acreages are noted above in SEIS Table 3.1-2.

As described in SEIS Section 3.1.3, *Related Renewable Energy Projects*, the indirect impacts of activities associated with the construction, maintenance, and operation of the related renewable energy projects are analyzed in the Chapter 3 resource sections (SEIS Sections 3.2 through 3.18). The effects of these projects would be the same across all action alternatives. The analysis of these projects includes the construction of wind turbine towers, photovoltaic solar panels, transmission lines, cooling systems, access roads, surface impoundments, electrical collector substations and transformer pads and other ancillary features (such as generation tie lines). Vegetation clearing may be required for the permanent footprints of project infrastructure and temporary work areas. Analysis of the operation and maintenance of the related renewable energy projects includes intermittent construction and use of access roads or work areas required for maintenance and repairs.

Due to the nature of indirect effects and the lack of detailed information about most of the related renewable energy projects, the analysis of these projects qualitatively describes the types of impacts that would be anticipated to occur from construction, operation and maintenance, and decommissioning generally, rather than at a project-specific level of detail. Where project areas are known and specific effects on the resources in those areas can be identified, such effects are included in the effects analysis for the related renewable energy projects.

Construction of the R-Project could result in increased electrical generation capacity for Thunderhead (Appendix E, *NPPD Summary of Thunderhead Wind Energy Center Operations*); therefore, the indirect effects of increased electrical generation capacity are analyzed in SEIS Chapter 3. Because Thunderhead was constructed with an interconnection to a WAPA transmission line, as opposed to the interconnection to the R-Project anticipated in the FEIS, construction (which is already completed) is not considered an indirect effect of the R-Project. Additionally, Thunderhead is currently approved to operate at 195 MW. Therefore, operation of Thunderhead up to 195 MW is not considered an indirect effect of the R-Project. A temporary agreement allows Thunderhead to operate at 300 MW under most conditions until the R-Project is constructed and operational, at which point the project would consistently be able to operate at 300 MW (Appendix E, *NPPD Summary of Thunderhead Wind Energy Center Operations*). Because the R-Project would enable Thunderhead to permanently operate at 300 MW, this increase in generation capacity from 195 MW to 300 MW is analyzed as an indirect effect of the R-Project in SEIS Chapter 3. Additionally, the Thunderhead project in its entirety is analyzed as an existing wind facility in SEIS Chapter 4, *Cumulative Impacts*.

3.1.4.3 Significant Effects Determination

FEIS Section 3.1.2 is incorporated by reference into the SEIS. Where appropriate, the SEIS includes significance conclusions and determinations in the SEIS resource sections under the *Environmental Consequences* subsections. Unless otherwise noted or described in the SEIS, the FEIS significance determinations that are found in the separate *Effects Summary* subsections of the FEIS are incorporated by reference into this SEIS.

Section 3.2
Geology, Mineral Resources, Paleontological Resources, and Soils

3.2.1 Affected Environment

3.2.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.2.1, *Affected Environment*, about geologic, mineral, paleontologic, and soil resources in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.2.1.2 Related Renewable Energy Projects

The following sections describe the affected environment for geologic, mineral, paleontologic, and soil resources for the related renewable energy projects study area.

Geology

The surficial geology of the related renewable energy projects study area is generally the same as that described in the FEIS for the proposed action and alternatives (primarily Cenozoic deposits in the western, northern, and central portion of the study area) but also includes older Paleozoic and Mesozoic sedimentary rocks in the eastern and southern portion of the study area. As described in FEIS Section 3.2.1.1, *Geology*, the Cenozoic terrestrial deposits are largely made up of the Sandhills and the Ogallala Group, which occupy much of the western and central portions of the study area, including Cheyenne County and Greeley County and the proposed Prairie Hills Wind project area. In Holt County, which is in the northeastern portion of the study area, Mesozoic rocks are exposed in river valleys. Other geologic units, found in Holt County and the Thunderhead Wind Energy Center (Thunderhead) project area, include eolian deposits, such as the Peoria Loess. In Jefferson and York Counties and the proposed Big Blue Nebraska project area, the surficial geology is made up of Paleozoic and Mesozoic rocks of primarily marine origin. Geologic units in this area include the Pierre Shale, the Niobrara Limestone, the Carlile Shale, the Greenhorn Limestone-Graneros Shale, and the Dakota Group. Information on aquifers underlying the study area is included in SEIS Section 3.3, *Water Resources*.

Mineral Resources

Mineral resources in the related renewable energy projects study area are described below.

- **Cheyenne County:** Mineral resources include aggregate (sand, gravel, and silt) at abandoned, inactive, and active mineral mines and quarries. No oil, natural gas, or coal operations occur in Cheyenne County (University of Nebraska–Lincoln 2023).

- **Greeley County:** Mineral resources include aggregate (sand and gravel) and chalk at abandoned, inactive, and active mineral mines and quarries. No oil, natural gas, or coal operations occur in Greeley County (University of Nebraska–Lincoln 2023).
- **Holt County:** Mineral resources include aggregate (sand, gravel, and silt) as well as sandstone at abandoned, inactive, and active mineral mines and quarries. No oil, natural gas, or coal operations occur in Holt County (University of Nebraska–Lincoln 2023).
- **Jefferson County:** Mineral resources include aggregate (sand, gravel, and silt), clay, shale, limestone, and volcanic ash at abandoned, inactive, and active mineral mines and quarries. No oil, natural gas, or coal operations occur in Jefferson County (University of Nebraska–Lincoln 2023).
- **York County:** Mineral resources include aggregate (sand, gravel, and silt) found at abandoned, inactive, and active mineral mines and quarries. No oil, natural gas, or coal operations occur in York County (University of Nebraska–Lincoln 2023).

There are no known mineral resource operations in the project areas for Prairie Hills Wind, Big Blue Nebraska, or Thunderhead.

Paleontological Resources

Nebraska is well known for its abundant paleontological resources, and the University of Nebraska State Museum fossil collection contains more than 1 million specimens. Sediments deposited during the Cenozoic (i.e., the past 65 million years) formed in a variety of terrestrial settings. In particular, the Pleistocene glacial deposits that overlie much of Nebraska (excluding the far eastern counties) have yielded many vertebrate fossils, including mammoths, bison, horses, elk, camels, and rodents. Examples of older fossils from the Neogene (i.e., Miocene and Pliocene) include horse, rhinoceros, bats, crane, and tortoise (UNSM 2023). Many of these fossils are remarkably preserved in ash beds and rhinoceros beds of the Ashfall Fossil Beds State Historical Park (UNSM 2023; Paleontology Portal 2023).

Examples of fossils discovered in surficial deposits during excavation for Nebraska highways include 65 animals from the early Miocene discovered at the Wildcat Hills sites during excavation for Nebraska Highway 71 (Nebraska Department of Transportation 2023). The Potential Fossil Yield Classification (PFYC) rating of these widespread fossiliferous Pleistocene and Neogene deposits in the related renewable energy projects study area would be high. The UNSM (2023) provides records of fossils from Jefferson and Antelope counties but does not specifically note fossils from the other study area counties.

Soils

Soil characteristics for the related renewable energy projects study area were evaluated using data obtained from the Natural Resources Conservation Service (NRCS) soils surveys (USDA, NRCS 2023) for Holt, Cheyenne, Jefferson, York, and Greeley counties and for the Prairie Hills Wind, Big Blue Nebraska, and Thunderhead project areas. Dominant soil orders in the study area are Mollisols (i.e., soils with deep, high organic matter, nutrient-enriched surface soils) in areas outside of the Sandhills and Entisols (i.e., soils that show minimal profile development

other than A Horizon), which are more predominant in the Sandhills where soils are generally very deep, excessively drained, and often minimally altered from the parent materials.

Erosion Potential

Wind erodibility, K Factor[1], T Factor[2], and slope, were used to evaluate erosion potential. Generally, susceptibility to water erosion is relatively low in the study area because of the highly permeable nature of sandy soils, except where slopes are steep. Erosion potential can be summarized as follows.

- Most soils in the study area have a low to moderate susceptibility to erosion by wind, except for Holt County and the Thunderhead project area, which are susceptible to severe erosion by wind (Appendix E, *Soils Technical Supplement*, Tables 1 and 2).
- Soils in Cheyenne, Greeley, and Holt counties and the Thunderhead project area have a low to moderate K Factor, indicating low to moderate potential to erode, whereas Jefferson and York counties, and the Prairie Hills Wind (Custer County) and Big Blue Nebraska (Jefferson County) proposed project areas have a high K Factor (Appendix E, Tables 3 and 4).
- The soil T Factor for the full study area is high, indicating deep soils least subject to the effects of erosion (Appendix E, Tables 5 and 6).
- Most land in the study area has slopes of less than 15%, except for the Prairie Hills Wind proposed project area (58% slopes of greater than 15%) (Appendix E, Tables 7 and 8).

Prime Farmland

Prime farmland contains soils with the best physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops (7 CFR 657.5(a)(1)). It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. Undeveloped land with high crop production potential may be classified as prime farmland. The State Conservationist can designate specific soil map units as farmland of statewide importance.

Appendix E, Tables 9 and 10, show the acres and percentage of prime farmland, prime farmland if drained, prime farmland if irrigated, and farmland of statewide importance in the study area (USDA, NRCS 2023). Prime farmland is primarily located in Jefferson County (64%), the Big Blue Nebraska proposed project area (64%), and York County (82%). Prime farmland if irrigated is located mostly in Cheyenne County (71%). The proposed Big Blue Nebraska project area has the greatest amount of farmland of statewide importance (24%). Most of the proposed Prairie Hills Wind project area (90%), Holt County (73%), and Greeley County (77%) are not

[1] K Factor is the index used to measure a soil's potential to erode and also the rate of runoff as measured compared to a standard condition. Soil K Factors can range from 0.02 to 0.6 (USDA 2001). Low K Factors were assumed to range from 0.02 to 0.25, moderate K Factors from 0.25 to 0.37, and high K Factors greater than 0.37.

[2] T Factor is an indicator of soil loss tolerance, or the amount of soil loss that can be tolerated for a soil to remain productive. T Factors are integer values from 1 to 5 tons per acre per year. A factor of 1 ton per acre per year is for shallow or otherwise fragile soils; 5 tons per acre per year is for deep soils that are least subject to erosion damage.

prime farmland. The Thunderhead project area contains both prime farmland (20%) and farmland of statewide importance (29%).

Soil Restoration Potential

Soil restoration potential indicates the ability of soil to recover from degradation (i.e., restoring functional and structural integrity after disturbance). Soil compaction potential, amount of hydric soil, and a soil revegetation potential model were used to evaluate soil restoration potential for the related renewable projects study area. Highly compactable soils represent a very small portion of Cheyenne County (less than 1%), Greeley County (1%), Holt County (2%), and the project areas for Prairie Hills Wind (3%) and Thunderhead (less than 1%) (Appendix E, Tables 11 and 12). They comprise more of York County (14%), Jefferson County (41%), and the Big Blue Nebraska proposed project area (49%) (Appendix E, Tables 11 and 12). Hydric soils represent 1% or less of Cheyenne and Jefferson counties, the proposed Prairie Hills Wind and Big Blue Nebraska project areas, and the Thunderhead project area (Appendix E, Tables 11 and 12). They represent slightly larger areas in Greeley County (2%), York County (5%), and Holt County (11%) (Appendix E, Tables 11 and 12). Soil revegetation potential in the study area is high, with 98% or more of the land in the study area (Appendix E, Tables 13 and 14).

3.2.2 Environmental Consequences

3.2.2.1 Proposed Action and Alternatives

No Action

The effects of the no action alternative on geologic, mineral, paleontologic, and soil resources would be the same as presented in FEIS Section 3.2.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on geologic, mineral, paleontologic, and soil resources would be the same as presented in FEIS Section 3.2.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, with the following differences. Changes in the estimated temporary disturbance area required for the proposed action would result in increased disturbance to sensitive soils, prime farmland, and soils with limited restoration potential due to droughty and hydric conditions (Tables 3.2-1 through 3.2-3). However, the avoidance and minimization measures (AMMs) described in the FEIS would apply, reducing effects. The duration and intensity of effects would be the same as described for the FEIS proposed action (short and long term; low to moderate intensity).

Table 3.2-1. Soil Erosion Factors, Proposed Action Disturbance Area

	Highly Wind Erodible[a]	High K Factor[b]	Low T Factor[c]	Slope >= 15%
Construction Yards/Staging Areas	69.6	13.5	0.0	0
Fly Yards/Assembly Areas	276.1	0.4	0.3	7.3
Lattice Tower work area	136.9	0.0	0.1	25.2
Monopole work area	226.2	27.6	4.4	26.4
Pulling and Tensioning Sites	337.5	16.1	4.3	40.0
Temporary Road	512.1	8.6	3.0	71.9
Total	**1,558.3**	**66.2**	12.1	**170.8**

Source: gSSURGO 2023

[a] The SSURGO database divides wind erodibility into eight groups, and this table assumed that Groups 1 through 4 represent high to moderately wind-erodible soils with rates ranging from greater than 310 tons per acre per year (Group 1) to 86 tons per acre per year (Group 4). This table includes groups 1 to 4.

[b] K Factor is the index used to measure a soil's potential to erode and the rate of runoff as compared to a standard condition. Soil K Factors can range from 0.02 to 0.6 (DOE 2003). This table defines High K Factor as greater than 0.37.

[c] T Factor is an indicator of soil loss tolerance, or the amount of soil loss that can be tolerated for a soil to remain productive. The T Factors are integer values from 1 through 5 tons per acre per year, with the factor of 1 ton per acre per year representing shallow or otherwise fragile soils and 5 tons per acre per year representing deep soils that are least subject to damage by erosion. This table uses a loss tolerance of 2 tons per acre per year as a guideline.

Table 3.2-2. Prime Farmland[a], Proposed Action Disturbance Area

	All Areas are Prime Farmland	Prime Farmland if Drained	Farmland of Statewide Importance
Construction Yards/Staging Areas	25.6	0.0	0.0
Fly Yards/Assembly Areas	16.6	0.0	5.5
Lattice Tower work area	0.5	0.0	0.0
Monopole work area	49.2	4.1	2.8
Pulling and Tensioning Sites	31.2	0.6	0.0
Temporary Road	20.2	2.4	1.2
Total	**143.3**	**7.1**	**9.6**

Notes:

[a] Prime farmland data from SSURGO (USDA, NRCS 2023)

Table 3.2-3. Soil Restoration Factors, Proposed Action Disturbance Area

	Highly Compaction Prone Soils[a]	Droughty Soils[b]	All Hydric Soils[c]
Construction Yards/Staging Areas	0.0	63.4	4.8
Fly Yards/Assembly Areas		190.8	26.1
Lattice Tower work area		122.3	5.8
Monopole work area	0.2	202.6	18.8
Pulling and Tensioning Sites	0.1	284.0	27.5
Temporary Road	0.0	431.7	34.7
Total	**0.4**	**1,294.8**	**117.7**

Source: gSSURGO 2023

[a] Includes soils identified as compaction prone per SSURGO.

[b] Droughty soils are assumed to include all coarse-textured soils and all soils with a drainage class of moderately to excessively well drained, per SSURGO.
[c] Includes soils that are rated as being hydric, per SSURGO.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on geologic, mineral, paleontologic, and soil resources would be the same as presented in FEIS Section 3.2.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on geologic, mineral, paleontologic, and soil resources would be the same as presented in FEIS Section 3.2.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference. The estimated area of temporary disturbance for Alternative B is greater than under the proposed action, resulting in more potential disturbance to sensitive soils, prime farmland, and soils with limited restoration potential due to droughty and hydric conditions (Tables 3.2-4 through 3.2-6). The AMMs described in the FEIS would apply to Alternative B and would reduce these effects. Overall, the duration and intensity of the effects would be the same as described in the FEIS for Alternative B (short and long term; low to moderate intensity).

Table 3.2-4. Soil Erosion Factors, Alternative B Disturbance Area

	Highly Wind Erodible[a]	High K Factor[b]	Low T Factor[c]	Slope >= 15%
Construction Yards/Staging Areas	69.6	13.5	0.0	4.8
Monopole work area	766.0	27.6	5.1	44.7
Pulling and Tensioning Sites	419.8	16.1	4.4	34.0
Temporary Road	912.1	16.4	5.6	62.8
Total	2,167.5	73.6	15.0	146.3

Source: gSSURGO 2023
[a] The SSURGO database divides wind erodibility into eight groups, and this table assumed that Groups 1 through 4 represent high to moderately wind-erodible soils with rates ranging from greater than 310 tons per acre per year (Group 1) to 86 tons per acre per year (Group 4). This table includes groups 1 to 4.
[b] K Factor is the index used to measure a soil's potential to erode and the rate of runoff as compared to a standard condition. Soil K Factors can range from 0.02 to 0.6 (DOE 2003). This table defines High K Factor as greater than 0.37.
[c] T Factor is an indicator of soil loss tolerance, or the amount of soil loss that can be tolerated for a soil to remain productive. The T Factors are integer values from 1 through 5 tons per acre per year, with the factor of 1 ton per acre per year representing shallow or otherwise fragile soils and 5 tons per acre per year representing deep soils that are least subject to damage by erosion. This table uses a loss tolerance of 2 tons per acre per year as a guideline.

Table 3.2-5. Prime Farmland[a], Alternative B Disturbance Area

	All Areas are Prime Farmland	Prime Farmland if Drained	Farmland of Statewide Importance
Construction Yards/Staging Areas	25.6		
Monopole work area	51.4	4.1	2.8
Pulling and Tensioning Sites	31.2	0.6	
Temporary Road	38.0	4.5	2.3
Total	**146.3**	**9.2**	**5.1**

Notes:
[a] Prime farmland data from SSURGO (USDA, NRCS 2023)

Table 3.2-6. Soil Restoration Factors [a], Alternative B Disturbance Area

	Highly Compaction Prone Soils[a]	Droughty Soils[b]	All Hydric Soils[c]
Construction Yards/Staging Areas	0.0	63.4	4.8
Monopole work area	0.2	680.3	44.7
Pulling and Tensioning Sites	0.1	352.2	34.0
Temporary Road	0.1	767.4	62.8
Total	**0.4**	**1,863.4**	**146.3**

Source: gSSURGO 2023
[a] Includes soils identified as compaction prone per SSURGO.
[b] Droughty soils are assumed to include all coarse-textured soils and all soils with a drainage class of moderately to excessively well drained, per SSURGO.
[c] Includes soils that are rated as being hydric, per SSURGO.

3.2.2.2 Related Renewable Energy Projects

Effects on geologic, mineral, paleontologic, and soil resources would be short and long term and would range from low to moderate intensity. Short-term construction effects would be reclaimed and revegetated after construction. Long-term impacts would occur where structures, surface facilities, or access roads would be located for the duration of the projects. The analyses below assume that AMMs in compliance with local, state, and federal laws and regulations would be implemented during project construction, operation, and maintenance.

Geology

Effects on geologic resources from the construction of the related renewable energy projects would consist of the displacement of soil and alteration of geologic features from earth-moving activities during construction. The depth of foundations is not known at this time. The use of construction vehicles and earth-moving equipment required for structure foundations and structure placement would result in short-term, low-intensity effects on local surface geology from compaction near unimproved roadbeds and on sensitive landscapes, especially if these impacts occur in areas with compaction-prone soils. In general, compactable soils represent a very small portion of the study area (less than 3%), except for York County (14%), Jefferson

County (41%), and the proposed Big Blue Nebraska (Jefferson County) project area (49%), which contain larger amounts of compactible soils.

Operation and maintenance activities are not expected to affect surface or bedrock geology.

Mineral Resources

Although the precise locations of most of the related renewable energy projects are not known at this time, it can be assumed future renewable energy projects would not cross any active mines or quarries. However, construction, operation, and maintenance of future renewable energy projects could potentially limit access to newly discovered aggregate resources and prevent the mineral owner from developing those minerals in the future in that area. It is also possible that undiscovered mineral resources may exist directly underneath the footprints of the related renewable energy projects and that some types of resources would not be practically accessible for the life of the projects, which would constitute a long-term, low-intensity effect on mineral resources. The types of minerals that would be affected would be near-surface mineral material deposits (e.g., sand, gravel, and silt).

Direct, short-term, low-intensity effects on mineral resources would occur in the unlikely event that construction, operation, or maintenance activities were to temporarily prevent access to any newly discovered mineral resources. If any mineral access issues occurred, they would occur during active construction, in the form of road closures or other access restrictions while construction occurs in specific areas.

No coal-resource mining, or oil and natural gas well operations occur in the related renewable projects study areas; therefore, operation of the related renewable energy projects would not affect mineral extraction.

Paleontological Resources

Types of effects of the related renewable energy projects on paleontological resources would be similar to those of the proposed action and alternatives. The geologic units affected by these projects could have a PFYC rating of high, as geologic units with a rating of high are widespread in Nebraska (Nebraska Department of Transportation 2023, UNSM 2023).

Construction activities such as site grading, establishing borrow areas, and excavating foundations for turbines, control buildings, and electrical power conditioning facilities and substations would include ground disturbance that could have long-term effects on paleontological resources. These activities could occur in surficial geologic units with a PFYC rating of high or moderate. In addition, even in locations where alluvial and sand deposits on the surface are too young to contain paleontological resources, excavation could extend into the older geologic units, which are generally more suitable for construction. Therefore, paleontological resources could be damaged or destroyed by construction, resulting in the loss of potentially significant scientific data. Effects on paleontological resources would be long term and of low to moderate intensity depending on site-specific conditions and the AMMs implemented. Operation and maintenance activities are not expected to affect paleontological resources, as they would primarily take place in already-disturbed areas.

Soils

Similar to the proposed action and alternatives, the related renewable energy projects could result in long-term effects on soils from the loss of surface lands and soil productivity and quality. Impacts on soils at these sites, while permanent, would be localized to the boundaries of the project sites. These effects would be long term and of low intensity.

Temporary surface disturbance from construction activities, such as tree clearing, excavating, grading, topsoil segregation, and backfilling, would modify soils by disrupting soil stability, changing vegetation cover that can reduce nutrient recycling, decreasing productivity, and increasing compaction and rutting. Because bare soil with a surface layer that has been altered from its natural condition is more susceptible to accelerated wind and water erosion than undisturbed soil, any surface disturbance could degrade soil quality and productivity until vegetation or other ground cover is established. Modification of vegetation types (e.g., converting a forested area to grassland) would modify soil productivity and soil development. Although long-term soil productivity would be altered, nutrient cycling would continue from the continual addition of leafy vegetation litter associated with grass and low-growing shrub species and the effect would be of low to moderate intensity depending on site-specific conditions.

Soil Erosion

Certain soils in the related renewable energy project study area would be more sensitive to soil erosion, including those with high wind erodibility (Holt County and the Thunderhead project area), high K Factor (Jefferson and York counties and the proposed Prairie Hills Wind and Big Blue Nebraska project areas), and steep slopes (proposed Prairie Hills Wind project area). These more erodible soils would be more susceptible to erosion from surface-disturbing activities than nonsensitive (i.e., less erodible) soils.

The exact location and amount of soil disturbance for the related renewable energy projects, including permanent access roads for maintenance, is currently unknown and would depend on site-specific conditions, landowner negotiations, and the exact nature of the activities.

Prime Farmland

Where structure foundations are placed in prime and unique farmland, long-term effects would occur in the form of lost soil resources and permanent removal of land from production. As described above, prime farmland is primarily located in Jefferson County, York County, and the proposed Big Blue Nebraska (Jefferson County) project area. It is unknown at this time if the related renewable projects would result in any loss of farmland; nonetheless, because of the small footprint of projects, it is expected that the overall effects on prime farmland, while long term, would be low intensity.

Construction activities associated with the related renewable projects could have short-term effects on prime farmland soils if these soils became temporarily closed to agricultural activity during construction. The temporary loss of these lands would be reversed when construction is completed and soils are returned to production.

Overall, effects on prime farmland soils would be of low intensity.

Soil Restoration Potential

Over 98% of the soils in the related renewable energy project study area are classified as having a high potential for revegetation due to the Sodium Absorption Ratio, Electrical Conductivity, and pH attributes. Hydric soils, the disturbance of which can result in a decreased water storage capacity, decreased porosity, and a decreased ability to replace hydrophytic vegetation, represent only a small portion of the study area. Therefore, the soil restoration and revegetation potential in all areas is high, and effects would be short term and low intensity.

Section 3.3
Water Resources

3.3.1 Affected Environment

3.3.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.3.1, *Affected Environment*, about water resources in the study area for the proposed action and alternatives is incorporated by reference into this SEIS with changes based on updated information described below.

The Nebraska Department of Environment and Energy (NDEE) maintains a list of Clean Water Act (CWA) Section 303(d) impaired waters in Nebraska, reporting changes to the list every 2 years, per Section 305(b) of the CWA. The most recently EPA-approved NDEE *Nebraska Water Quality Integrated Report* lists 22 surface waterbodies that occur in the study area (Table 3.3-1) (NDEE 2021). Impaired waterways may require pollution control and management strategies depending on the cause of impairment (i.e., from the natural environment or human related). Of the seven impaired waterways crossed by the proposed transmission line, two have impairments due to natural causes and five are impaired due to pollutants.

Available FEMA mapped floodplain zone information was also obtained for the study area. Of the nearly 4.5 million designated floodplain acres in the study area, only approximately 1.07 million acres have been mapped and given designations by FEMA. Designations include 72,737 acres of high risk areas (Zone A; 1% annual chance of flooding) and 997,511 acres of minimal flood hazards areas (Zone X; less than 0.2% annual chance of flooding).

Table 3.3-1. Impaired Surface Waters in the Study Area for the Proposed Action and Alternatives

Waterbody	Cause of Impairment	Use Group	Crossed by Proposed Transmission Line
Birdwood Creek	*Escherichia coli*	Recreation	X
Calamus Reservoir	Fish consumption advisory (mercury); chlorophyll a (total nitrogen and phosphorus)	Aquatic life	
Calamus River	*Escherichia coli*	Recreation	X
	Naturally high temperature	Aquatic life	
Clearwater Creek	*Escherichia coli*	Recreation	
Dismal River	*Escherichia coli*	Recreation	X
Ditch No. 2	*Escherichia coli*	Recreation	
East Hershey Lake	Fish consumption advisory (mercury)	Aquatic life	
East Sutherland Lake	Fish consumption advisory (mercury)	Aquatic life	

Waterbody	Cause of Impairment	Use Group	Crossed by Proposed Transmission Line
Elkhorn River	*Escherichia coli*	Recreation	
Fremont Slough	Impaired aquatic community (unknown)	Aquatic life	
Goose Lake	Fish consumption advisory (mercury)	Aquatic life	
Hershey Lake	Fish consumption advisory (mercury)	Aquatic life	
Middle Loup River	*Escherichia coli*	Recreation	X
	Naturally high temperature	Aquatic life	
North Fork Dismal River	*Escherichia coli*	Recreation	
North Loup River	Naturally high temperature	Aquatic life	X
	Escherichia coli	Recreation	
North Platte River	Temperature (naturally elevated)	Aquatic life	X
South Fork Dismal River	*Escherichia coli*	Recreation	
South Fork Elkhorn River	*Escherichia coli*	Recreation	
Sutherland Reservoir	Fish consumption advisory (hazard index compounds)	Aquatic life	
Sutherland Reservoir Outlet Canal	Fish consumption advisory (hazard index compounds- PCBs, mercury)	Aquatic life	X
Unnamed Creek (Sec 11-14N-31W) - Headwaters to Sec 5-14N-31W	Impaired aquatic community (unknown)	Aquatic life	
Unnamed Creek (Sec 31-14N-33W)	*Escherichia coli*	Recreation	
West Birdwood Creek	*Escherichia coli*	Recreation	

Source: NDEE 2021

3.3.1.2 Related Renewable Energy Projects

Surface Waters

The related renewable energy projects study area is in portions of the following U.S. Geological Survey (USGS) sixth level hydrologic unit code (HUC-6) basins: Big Blue, Elkhorn, North Platte, Loup, Niobrara, South Platte. The study area intersects 30 HUC-8 subbasins (USGS 2023). The proposed Big Blue Nebraska and Prairie Hill Wind projects and the existing Thunderhead Wind Energy Center (Thunderhead) project occur in portions of three USGS HUC-6 basins (Big Blue, Elkhorn, and Loup) and intersect six HUC-8 subbasins (USGS 2023).

The following rivers occur in the study area: the Elkhorn River and its north and south branches, Big Blue River and its west fork, Cedar River, Keya Paha River, Little Blue River, Niobrara River, and North Loup River. The descriptions of the Cedar, Elkhorn, and North Loup Rivers in FEIS Section 3.3.1.1, *Surface Waters,* are incorporated by reference into this SEIS.

The Niobrara River originates in eastern Wyoming and flows 568 miles west to east through northern Nebraska, eventually converging with the Missouri River at Niobrara, Nebraska. This confluence is approximately 13 miles east of the study area. In the study area, the river flows along the northern border of Holt County. The river is braided with sandbars and vegetated islands through this reach (Schneider et al. 2011). The Niobrara River is fed by both springs and precipitation runoff and serves as the primary drainage for the northern Sandhills; two dams regulate river water management (Schneider et al. 2011). The Keya Paha River, which originates in South Dakota and flows southeast into Nebraska, touches the northern border of the study area where it merges with the Niobrara River. Less than 150 feet of the river overlaps with the study area.

The Big and Little Blue Rivers are in eastern Nebraska, where they flow southeast out of the state and converge in Kansas. The Big Blue and West Fork Big Blue Rivers originate in central Nebraska. The West Fork Big Blue River, located between the Little and Big Blue Rivers, flows east 75 miles to its confluence with the Big Blue River north of Crete, Nebraska. The Big Blue River is approximately 359 miles long. Both rivers have curving channels, are forested along much of their length, and supply water to agricultural fields. In the study area, the Big Blue River crosses the northwest corner of York County, while the West Fork Big Blue River occurs in the southern quarter of the county. Larger tributaries of the Big Blue River include Cub Creek and Big Indian Creek; both originate in Jefferson County and flow northeast to the Big Blue River.

The Little Blue River is south and west of the Big Blue River and the West Fork Big Blue River. It flows 245 miles southeast to its confluence with the Big Blue River. Passing through Jefferson County, the river is fed by both precipitation runoff and groundwater sources (Little Blue Natural Resources District 2011). The river has a meandering channel with exposed sandbars, wooded or shrubby vegetation, and occasional breaks and bluffs lining its banks (Schneider et al. 2011).

Numerous other named and unnamed rivers, streams, and other linear water features (e.g., canals, ditches) occur in the study area. Table 3.3-2 shows the miles of streams, rivers, and other linear water features in the counties that contain renewable energy projects without known locations: Holt, Cheyenne, Jefferson, York, and Greeley.

Table 3.3-3 shows the miles of streams, rivers, and other linear water features in the proposed project areas for Prairie Hills Wind and Big Blue Nebraska, and the existing project area for Thunderhead. The Prairie Hills Wind project area includes all or portions of 11 creeks and streams, totaling 196.9 miles. The Big Blue Nebraska project area includes 4 creeks, totaling 84.8 miles. Two of four creeks in the Big Blue Nebraska project area are associated with Big Indian Creek and Cub Creek and their reservoir systems. The Thunderhead project area includes all or portions of 4 creeks and streams, totaling 52.6 miles.

The study area contains 8,864.6 miles of linear water features, with Holt County having the most miles (2,762.6 miles, 31% of total study area miles). Intermittent stream types account for 7,215.6 miles (81% of total study area miles).

Table 3.3-2. Miles of Streams, Rivers, and Other Linear Water Features, Related Renewable Energy Projects Study Area, by County

County	Description	Total Miles	Percent of Stream Miles (by County)
Cheyenne County	Intermittent Stream	1,486.9	88.5%
	Perennial Stream	68.3	4.1%
	Other[a]	125.8	7.5%
	Cheyenne County Total	*1,681.0*	
Greeley County	Intermittent Stream	1,261.8	87.9%
	Perennial Stream	29.0	2.0%
	Other [a]	144.1	10.0%
	Greeley County Total	*1,434.9*	
Holt County	Ephemeral Stream	0.8	0.0%
	Intermittent Stream	1,878.7	68.0%
	Perennial Stream	601.8	21.8%
	Stream/River, Type Undetermined	0.1	0.0%
	Other [a]	282.4	10.2%
	Holt County Total	*2,763.8*	
Jefferson	Stream/River: Intermittent	1,333.8	86.7%
	Stream/River: Perennial	89.2	5.7%
	Other [a]	116.3	7.6%
	Jefferson County Total	*1,539.2*	
York County	Intermittent Stream	950.7	85.6%
	Perennial Stream	82.7	7.4%
	Other [a]	77.7	7.0%
	York County Total	*1,111.1*	
Total	Ephemeral Stream	0.8	Less than 0.1%
	Intermittent Stream	6,986.9	81.1%
	Perennial Stream	873.1	10.1%
	Stream/River, Type Undetermined	0.1	Less than 0.1%
	Other [a]	753.9	8.8%
	Study Area Total	*8,614.9*	

Source: USGS 2023

[a] Includes artificial paths, aqueducts, canals, connectors, ditches, and siphons.

Table 3.3-3. Miles of Streams, Rivers, and Other Linear Water Bodies in the Related Renewable Energy Projects Study Area, Project Areas

Project	Description	Total Miles	Percent of Stream Miles (by Project)
Big Blue Nebraska	Intermittent Stream	75.2	88.7%
	Perennial Stream	2.0	2.4%
	Other[a]	7.6	8.9%
	Big Blue Nebraska Total	*84.8*	

Project	Description	Total Miles	Percent of Stream Miles (by Project)
Prairie Hills Wind	Intermittent Stream	182.9	92.9%
	Perennial Stream	1.1	0.6%
	Other[a]	12.8	6.5%
	Prairie Hills Wind Total	*196.9*	
Thunderhead	Intermittent Stream	45.7	86.8%
	Perennial Stream	*4.6*	8.7%
	Other[a]	*2.4*	4.5%
	Thunderhead Total	*54.1*	

Source: USGS 2023

[a] Includes artificial paths, aqueducts, canals, connectors, ditches, and siphons.

The study area contains over 120 named lakes, ponds, and reservoirs and over 8,500 smaller unnamed waterbodies, totaling 18,814.6 acres. The largest of these waterbodies is Dora Lake in Holt County (452 acres). Table 3.3-4 presents the total acreage of waterbodies by county. Holt County has the highest acreage of ponds, lakes, marshes, and similar waterbodies, given the county's location in the Sandhills and proximity to the Niobrara River. As described in FEIS Sections 3.3.1.1, *Surface Waters*, and 3.4, *Wetlands*, high water tables and lack of surface drainage in the Sandhills allow for more ponds and wetlands to form in this region.

Table 3.3-5 shows surface waterbodies in the known project areas for Prairie Hills Wind, Big Blue Nebraska, and Thunderhead. The proposed Prairie Hills Wind project area includes three unnamed open water bodies totaling 195.0 acres. The proposed Big Blue Nebraska project area includes 10 open water bodies totaling 279.2 acres, six of which are associated with Big Indian Creek and Cub Creek and their reservoir systems. The Thunderhead project area includes five open water bodies, including one reservoir in Holt County totaling 7.0 acres and four unnamed water bodies in Antelope and Wheeler Counties totaling 49.8 acres.

Table 3.3-4. Total Acreages of Lakes, Reservoirs, Ponds, and Wetlands in the Related Renewable Energy Projects Study Area, by County

County	Description	Total Acreage	Percent Total Acreage (by County)
Cheyenne	Lake/Pond: Uncategorized	7.5	1.0%
	Lake/Pond: Intermittent	552.7	76.1%
	Lake/Pond: Perennial	137.4	18.9%
	Reservoir	10.2	1.4%
	Swamp/Marsh	18.7	2.6%
	Cheyenne County Total	*726.3*	
Greeley	Lake/Pond: Perennial	1,258.7	98.0%
	Reservoir	24.0	1.9%
	Swamp/Marsh	1.9	0.1%
	Greeley County Total	*1,284.5*	

County	Description	Total Acreage	Percent Total Acreage (by County)
Holt	Lake/Pond: Uncategorized	368.7	3.5%
	Lake/Pond: Intermittent	63.7	0.6%
	Lake/Pond: Perennial	6,248.2	59.1%
	Reservoir	58.2	0.6%
	Swamp/Marsh	3,826.6	36.2%
	Holt County Total	*10,565.4*	
Jefferson	Lake/Pond: Uncategorized	33.9	1.2%
	Lake/Pond: Intermittent	<0.1	<0.1%
	Lake/Pond: Perennial	2,699.2	95.0%
	Reservoir	82.5	2.9%
	Swamp/Marsh	24.8	0.9%
	Jefferson County Total	*2,840.4*	
York	Lake/Pond: Uncategorized	8.4	0.3%
	Lake/Pond: Perennial	1,510.9	47.8%
	Reservoir	246.1	7.8%
	Swamp/Marsh	1,394.7	44.1%
	York County Total	*3,160.1*	
Total		**18,576.8**	

Source: USGS 2023

Table 3.3-5. Total Acreages of Lakes, Reservoirs, Ponds, and Wetlands in the Related Renewable Energy Projects Study Area, Project Areas

Project	Description	Total Miles	Percent of Stream Miles (by Project)
Big Blue Nebraska	Lake/Pond: Perennial	267.6	95.8%
	Lake/Pond: Uncategorized	4.4	1.5%
	Reservoir	7.3	2.7%
	Big Blue Nebraska Total	*279.2*	
Prairie Hills Wind	Lake/Pond: Perennial	169.0	86.7%
	Reservoir	1.5	0.8%
	Swamp/Marsh	24.5	12.6%
	Prairie Hills Wind Total	*195.0*	
Thunderhead	Lake/Pond: Perennial	48.3	97.0%
	Reservoir	0.5	1.0%
	Swamp/Marsh	1.0	2.0%
	Thunderhead Total	*49.8*	

Source: USGS 2023

As of 2020, there were 31 impaired streams and rivers and 13 impaired lakes and reservoirs in the study area, including the following (NDEE 2021).

- Cheyenne County: Two impaired stream segments, totaling 76 miles.
- Custer County: One impaired stream segment, totaling 0.5 mile.
- Greeley County: Two impaired stream segments, totaling 31 miles; one impaired waterbody, totaling 135.9 acres.
- Holt County: 16 impaired stream segments, totaling 237.9 miles; two impaired waterbodies, totaling 186.3 acres.
- Jefferson County: Five impaired stream segments, totaling 67.1 miles; eight impaired waterbodies, totaling 167.1 acres.
- York County: Five impaired stream segments, totaling 102.8 miles; two impaired waterbodies, totaling 41.3 acres.

Of the known and proposed project areas, only Big Blue Nebraska and Prairie Hills Wind have impaired waterbodies. The proposed Big Blue Nebraska project area has one impaired lake (22.8 acres) and one impaired stream (2.0 miles). The proposed Prairie Hills Wind project area has one impaired stream (0.5 mile).

Causes of impairment present in these streams and waterbodies include impaired aquatic community (unknown), *Escherichia coli (E. coli)*, Atrazine (May–June), Chlorophyll, total nitrogen and phosphorus, algae toxins (microcystin), chlorophyll, pH, mercury, and temperature (naturally elevated) (NDEE 2021). Because NDEE completes analyses of surface waters in Nebraska every 2 years, impaired waterbodies and the impairments' causes will change over time.

Groundwater

Groundwater in the related renewable energy projects study area originates from the Dakota and Ogallala Aquifers. The description of the Ogallala Aquifer in FEIS Section 3.3.1.2, *Groundwater*, is incorporated by reference. The Ogallala Aquifer occurs throughout the majority of Nebraska, including all of Antelope, Cheyenne, Custer, Greeley, Wheeler, and York counties, and the majority of Holt County. It occurs under the northern third of Jefferson County. The aquifer is closest to the surface in Antelope, Holt, and Wheeler counties, where depth to water is 0 to 50 feet, although in some areas the aquifer is deeper due to the sand dunes. In other counties, the depth to water is closer to 100 or 200 feet, with average depth to the aquifer the deepest in Cheyenne and Jefferson counties (Gutentag et al. 1984).

The Dakota Aquifer (also called the Maha Aquifer) is a secondary aquifer underlying most of Nebraska, with only counties in the extreme southeastern corner and central-eastern edges of the state excluded from its extent. All counties in the related renewable energy projects study area overly the Dakota Aquifer. While most of the aquifer is confined, there are portions which are unconfined. The Dakota Aquifer is closer to the surface in the eastern portion of Nebraska, where it connects to surface waterbodies in several locations, including sites in central and southern Jefferson County in the Little Blue River watershed. (Divine and Sibray 2017; Little

Blue Natural Resource District 2011). The aquifer is deeper underground (up to 3,500 feet) in the western part of the state and fewer wells tap the aquifer in this region as a result. These differences in geomorphic position, as well as characters of the bedrock layers through the aquifer affect how the aquifer recharges and its water qualities. The geology associated with the aquifer contributes to higher dissolved solids, salt, and sulfur content in the water. As result, the Dakota Aquifer is more often used as a secondary water source (Little Blue Natural Resource District 2011). Details about geology in the study area can be found in SEIS Section 3.2.2.1, *Geology*.

In the proposed Prairie Hills Wind project area, all of which overlies the Ogallala Aquifer, depth to the Ogallala Aquifer water is around 100 to 200 feet (Gutentag et al. 1984). The proposed Big Blue Nebraska project overlies 0.5 acres of the Ogallala Aquifer, where average depth to the aquifer water is between 100 and 200 feet (Gutentag et al. 1984). However, a Lower Big Blue Natural Resources District monitoring well 0.6 mile north of the project area boundary indicates depth to groundwater between 21 and 41 feet below land surface datum (Lower Big Blue Natural Resources District 2023). The proposed Big Blue Nebraska project area also overlies shallower but confined portions of the Dakota Aquifer, where average depth to aquifer water is about 90 feet (Divine and Sibray 2017; Miller and Appel 1997).

Floodplains

LANDFIRE floodplain vegetation types were used to map floodplains for the related renewable energy projects study area. There are approximately 11,264 acres of floodplain vegetation in the study area (Table 3.3-6) (LANDFIRE 2020). The only related renewable energy project area that contains floodplain vegetation is the proposed Big Blue Nebraska project area (216.1 acres of floodplain vegetation).

Table 3.3-6. Acreages of Floodplains in the Related Renewable Energy Projects Study Area

County or Project Area	Floodplain Vegetation (acres)
Holt County	4,937.0
Jefferson County	6,223.4
York County	103.2
Total	**11,263.6**

Source: LANDFIRE 2020

FEMA floodplain data are available for a portion of the study area. The primary FEMA mapped floodplain zones are associated with the following rivers: Keya Paha, North Platte, North Loup, Calamus, Little Blue, and West Fork Big Blue (FEMA 2023). Tables 3.3-7 and 3.3-8 present the acreages of FEMA floodplain zones by county and in the known and proposed project areas, respectively.

Table 3.3-7. FEMA Mapped Floodplain Zone Designations in the Related Renewable Projects Study Area, by County

Flood Zone Designation[a]	Cheyenne		Greeley		Holt		Jefferson		York		Total	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
A	4.1	<0.1	17,833.6	4.9	124.9	<0.1	31,482.0	9.0	34,864.6	9.5	84,309.2	2.5
AE	0.0	-	0.0	-	0.0	-	2,801.4	0.8	1,550.3	0.4	4,351.7	<0.1
X	26.0	<0.1	347,092.5	95.1	57.5	<0.1	313,875.3	90.1	331,915.3	90.0	992,966.6	29.2
No Data	765,157.1	99.9	29.0	<0.1	1,545,808.2	99.9	221.1	<0.1	444.9	0.1%	2311660.2	68.1

Source: FEMA 2023

[a] FEMA Flood Designations:

A = High risk areas with 1% annual chance of flooding.

AE = High risk areas where base flood plain elevations are provided.

X = Area of minimal flood hazard (protected by a levee from a 100-year flood or has a 0.2% annual chance of annual flooding).

No data = Mapping has not occurred or no digital data is available.

Table 3.3-8. FEMA Mapped Floodplain Zone Designations in the Related Renewable Projects Study Area, Project Areas

Flood Zone Designation[a]	Big Blue Nebraska		Prairie Hills Wind		Thunderhead		Total	
	Acres	%	Acres	%	Acres	%	Acres	%
A	1,494.9	7.3	1.1	<0.1	0.2	<0.1	1,496.3	1.2
X	16,063.2	92.7	19.5	<0.1	16,063.2	26.4	35.131.4	28.7
No Data	0.0	-	40,943.9	99.9	44,825.2	73.6	85.769.1	70.0

Source: FEMA 2023

[a] FEMA Flood Designations:

A = High risk areas with 1% annual chance of flooding.

X = Area of minimal flood hazard (protected by a levee from a 100-year flood or has a 0.2% annual chance of annual flooding).

No data = Mapping has not occurred or no digital data is available.

3.3.2 Environmental Consequences

3.3.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on water resources would be the same as presented in FEIS Section 3.3.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on water resources would be the same as presented in FEIS Section 3.3.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference, except for the following differences.

Surface Waters

The proposed action would cross one more stream than the FEIS proposed action (Gracie Creek, an intermittent/perennial stream), which would result in a negligible change in effects on sediment, surface water drainage and surface water flow and volume, stream channel stability, and water quality. The Revised HCP includes updated AMMs that would reduce potential effects on surface waters. Additionally, NPPD would be required to comply with all applicable federal, state, and regional water quality regulations. The duration and intensity of effects on surface water would be the same as described for the FEIS proposed action (short and long term, low intensity).

Groundwater

The types and intensity of effects on groundwater quality, including the Ogallala Aquifer, would be the same as those described for the FEIS proposed action.

In addition to effects on groundwater quality, excavation associated with the installation of steel monopole towers in areas with low depth-to-groundwater sources could alter natural groundwater flow. If steel monopole structures were installed in these shallow areas, they could alter the horizontal flow of groundwater in the system, resulting in elevated groundwater levels upstream of the obstruction and depleted groundwater levels downstream. This could affect recharge of groundwater-dependent downstream land cover types. Use of temporary roads could result in localized soil compaction, resulting in decreased soil moisture and water infiltration. However, these short-term effects would be reduced by implementation of a stormwater pollution prevention plan (SWPPP) and associated best management practices (BMPs) and the reclamation of temporary access areas following completion of construction. The Revised HCP includes updated AMMs that would reduce potential effects on groundwater. Additionally, NPPD would be required to comply with all applicable federal, state, and regional water quality regulations. Overall, these short- and long-term effects on groundwater quantity and flow would be of low intensity.

Floodplains

Changes in the estimated temporary disturbance areas required for the proposed action would result in a decrease in the estimated area of effects on floodplain vegetation types compared to the FEIS proposed action (Table 3.3-9). An estimated 11.0 acres of floodplain vegetation types would be affected during construction by temporary access roads, steel monopole work areas, and pulling and tensioning sites. Of the mapped portions of the proposed action disturbance areas, estimated temporary disturbance to Zone A (high risk areas with 1% chance annual flooding) would constitute approximately 49.6 acres (Table 3-3.10). The difference in the estimated temporary disturbance would not change the intensity of effects described for the FEIS proposed action (short and long term, low intensity).

Table 3.3-9. Acres of Temporary Disturbance to Floodplain Vegetation Types [a], Proposed Action

Project Component	Acres of Temporary Disturbance
Monopole work area	4.2
Pulling and tensioning sites	4.8
Temporary access road	2.0
Total Acres	**11.0**

Source: LANDFIRE 2020

[a] Land cover types include Western Great Plains Floodplain Forest and Woodland and Western Great Plains Floodplain Herbaceous.

Table 3.3-10. Acres of Temporary Disturbance to FEMA Mapped Floodplain Zone Designations[a], Proposed Action

	Acres of Temporary Disturbance		
Project Component	**A**	**X**	**No Data**
Construction yards/staging areas	-	34.0	50.3
Fly yards/assembly areas	-	117.0	161.6
Lattice tower work areas	1.3	78.3	57.8
Monopole work area	16.9	86.1	159.2
Pulling and tensioning sites	15.0	168.5	175.4
Temporary access road	16.5	267.4	242.9
Total Acres	**49.7**	**751.3**	**847.2**

Source: FEMA 2023

[a] FEMA Flood Designations:

A = High risk areas with 1% annual chance of flooding.

X = Area of minimal flood hazard (protected by a levee from a 100-year flood or has a 0.2% annual chance of annual flooding).

No data = Mapping has not occurred or no digital data is available.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on water resources, including surface water, groundwater, and floodplains, would be the same as presented in FEIS Section 3.3.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference. Effects on groundwater quantity and flow would be the same as under the proposed action.

Alternative B (Steel Monopole Only, Proposed Action Route)

Types and intensity of effects on water resources, including surface water, groundwater, and floodplains, would be the same as presented in FEIS Section 3.3.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference. Effects on surface water and groundwater resources would be greater under Alternative B than the proposed action because of the greater estimated temporary and permanent disturbance areas. Effects on floodplains under Alternative B would also be greater than under the proposed action because of changes in the estimated area of temporary and permanent disturbance to floodplain vegetation types and FEMA mapped floodplain zones (Tables 3.3-11 and 3.3-12). However, most effects would be temporary and the intensity of these short- and long-term effects would be the same as described in the FEIS for Alternative B (low intensity).

Table 3.3-11. Acres of Potential Disturbance to Floodplain Vegetation Types[a], Alternative B

Project Component	Acres of Temporary Disturbance
Monopole work area	4.2
Pulling and tensioning sites	4.7
Temporary access road	3.7
Total Acres	**12.7**

Source: LANDFIRE 2020

[a] Land cover types include Western Great Plains Floodplain Forest and Woodland and Western Great Plains Floodplain Herbaceous.

Table 3.3-12. Acres of Potential Disturbance to FEMA Mapped Floodplain Zone Designations[a], Alternative B

	Acres of Temporary Disturbance		
Project Component	**A**	**X**	**No Data**
Construction yard/staging areas	-	34.0	50.3
Monopole work area	22.9	397.2	384.1
Pulling and tensioning sites	15.6	214.8	211.1
Temporary access road	30.2	474.0	435.4
Total Acres	**68.7**	**1,120.0**	**1,080.9**

Source: FEMA 2023

[a] FEMA Flood Designations:

A = High risk areas with 1% annual chance of flooding

X = Area of minimal flood hazard (protected by a levee from a 100-year flood or has a 0.2% annual chance of annual flooding).

No data = Mapping has not occurred or no digital data is available.

3.3.2.2 Related Renewable Energy Projects

Surface Water

Construction of the related renewable energy projects could alter surface water flow (i.e., runoff, discharge, and drainage patterns) during surface-disturbing construction activities. Duration and intensity of effects would depend on the proximity of the project to surface water

resources and whether the construction was temporary (e.g., bridges or culverts to cross streams during construction, temporary access points, vegetation removal) or permanent (e.g., permanent structures that impede or change water flow through an area).

Sedimentation could occur from increased bare ground or changes to slope leading to erosion. Increased sedimentation can alter or block water flow. Standard operating procedures, and implementation of a SWPPP and associated BMPs, in accordance with NDEE National Pollutant Discharge Elimination System permitting regulations, would reduce spills and provide guidance on proper clean-up of pollutants and hazardous materials, reducing impacts on surface water resources. These would also reduce potential changes to water flow systems.

Conversely, if solar projects are sited in croplands they may have a localized beneficial effect on surface water, due to the beneficial effects of fallowing: lack of ploughing allows for development of soil biology; increased year-round cover reduces sediment runoff; and water quality in the region may be improved from the reduction in non-point source fertilizer, herbicide, and pesticide runoffs.

Surface water effects could result from accidental spills and leaking fuels and fluids from mechanical equipment, accidental release of wastewater, and sedimentation. Chemical contamination could result from herbicides, pesticides, and chemicals used for cleaning equipment can runoff into surface water. Incidental release of chemicals through water runoff from structures may affect surface water quality. Although it is possible these effects could occur once the projects are operational, most of these types of effects would occur during project construction and be limited to areas around facilities, turbines, and solar arrays. Additionally, construction of the related renewable energy projects would require water for construction (e.g., road and vehicle maintenance, fugitive dust management, building, and water for workers), which could be sourced from surface waterbodies. The amount of water used and resulting impact on surface water supplies would depend on project size and duration. Water usage, if sourced from surface waters, could lead to reduced downstream flow, but the duration of water usage would be short term and limited to project construction.

Construction of related renewable energy projects would result in short-term, low- to moderate-intensity effects on surface water, while the operation and maintenance of renewable energy projects would result in long-term, low-intensity effects.

Groundwater

Construction of the related renewable energy projects could affect groundwater quality. Groundwater sources near or at the surface could be affected by spilled and leaking fuels and fluids from mechanical equipment, accidental release of wastewater, and sedimentation. Chemical contamination of groundwater sources near the surface could occur from herbicides, pesticides, and chemicals used for maintenance could leach into ground water, affecting groundwater quality. Potential effects would be greatest during project construction and limited to areas around facilities, turbines, and solar arrays. Effects would be more likely to occur and greater in areas where there is no or low depth to groundwater. These would include portions of Holt County and other sites in the Sandhills where the Ogallala Aquifer is close to the surface, and Jefferson County where the Dakota Aquifer breaches the surface. Effects would

be less in other portions of the related renewable energy projects study area, where groundwater and aquifers are confined or deeper below the surface.

The effects on surface flow systems discussed above can also affect groundwater sources. Where surface water and groundwater sources are connected hydrologically, increased or decreased surface flow can cause depletion or recharging of groundwater resources. As described in SEIS Section 3.3.2.1, *Proposed Action and Alternatives*, excavation associated with the installation of renewable energy infrastructure in areas with low depth-to-groundwater sources could alter natural groundwater flow and affect recharge. Soil compaction and decreases in soil moisture may lead to decreased infiltration rates, affecting groundwater sources. Placement of renewable energy structures and supporting infrastructure away from intersections of groundwater and surface water sources would reduce negative impacts on these systems. Further, implementation of a SWPPP and associated BMPs would reduce potential impacts on groundwater systems. As described previously for surface waters, construction of the related renewable energy projects would require use of water for construction, which could be sourced from groundwater. Effects on groundwater would depend on project size and duration but would be short term and limited to project construction.

Potential effects on the Ogallala Aquifer from the proposed Prairie Hills Wind project would be minimal due to depth to the aquifer (100 to 200 feet below land surface). The proposed Big Blue Nebraska project also overlies both the Ogallala and the Dakota aquifers. A portion of the project occurs over the Ogallala aquifer and near a location where the groundwater table is within 20 to 50 feet of the land surface. Effects on the Ogallala Aquifer would be low given the relatively limited amount of surface disturbance associated with the renewable energy projects, low probability of a chemical spill contaminating groundwater, and the depth of the aquifer below the surface being below the depth at which foundations for facilities would be installed. Potential effects on the Dakota Aquifer would be minimal because the aquifer is confined.

Construction of related renewable energy projects would result in short-term, low-intensity effects on groundwater, while the operation and maintenance of renewable energy projects would result in long-term, low-intensity effects.

Floodplains

The related renewable energy projects could have the same types of effects on floodplain vegetation as the proposed action and alternatives. The area of estimated disturbance to floodplains cannot be known at the time of preparation of this SEIS, given the limited information available about project locations and footprints. However, it is assumed that developers would site both solar farms and wind turbines outside of floodplains due to best practices, and in accordance with applicable floodplain development restrictions (e.g., regional permitting requirements for developments in 100-year floodplains). Therefore, the construction and operation of related renewable energy projects are expected to result in long-term, low-intensity effects.

Section 3.4
Wetlands

3.4.1 Affected Environment

Federal regulations and policies regarding wetlands have changed since the FEIS. On January 28, 2023, EPA and the United States Army Corp of Engineers (USACE) released a revised definition of "Waters of the United States" (WOTUS) (33 CFR 328.3), which came into effect March 20, 2023. The new definition expanded what were considered WOTUS and provided guidance for surface waters that do not meet the WOTUS definition. However, portions of this definition became invalid following the U.S. Supreme Court's decision in the *Sackett v. Environmental Protection Agency* on May 25, 2023. In response, agencies developed a conforming rule, which amended the January 2023 revised definition. The amendment, titled "Revised Definition of 'Waters of the United States;' Conforming" became effective on September 8, 2023. Further, 27 states (including Nebraska) entered litigation with federal agencies regarding the January 2023 rule. As a result, agencies in these states are interpreting WOTUS consistent with pre-2015 regulatory regimes and the *Sackett* decision until further notice (EPA 2023). The *Sackett* decision determined that WOTUS are streams, rivers, lakes, and oceans with standing or flowing water and have relative permanence on the landscape; wetlands are considered a WOTUS when they have "a continuous surface connection" to WOTUS water bodies with no clear boundary between the two (EPA 2023). Neither the revised WOTUS definition nor Nebraska's current practice of interpreting WOTUS consistent with the *Sackett* decision and the pre-2015 regulatory regime affects Executive Order 11990 *Protection of Wetlands* or the *Swampbuster Provisions* of the Food Security Act, both of which provide additional protection to wetlands and were discussed in FEIS Section 3.4, *Wetlands*.

The State of Nebraska's *Wetland Program Plan* was most recently updated in 2019 and provides direction for managing the protection and restoration of wetlands in Nebraska (Lagrange 2019). Part of the program includes updating geospatial data of the state's wetland inventory utilizing the Service's National Wetlands Inventory (NWI) data and sampling wetland complexes throughout the state (FWS 2023). The Service updates NWI data on a regular basis.

3.4.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.4.1, *Affected Environment*, about wetlands in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.4.1.2 Related Renewable Energy Projects

There are approximately 248,484 acres of NWI-mapped wetlands in the related renewable energy projects study area. These include palustrine (222,524 acres), lacustrine (2,841 acres), and riverine (23,119 acres) wetlands. Table 3.4-1 shows the wetland types and their total acreages in the study area counties. Table 3.4-2 shows the wetland types and acreages present in the proposed project areas for the Prairie Hills Wind and Big Blue Nebraska projects and the

existing project area for the Thunderhead Wind Energy Center (Thunderhead). The proposed Prairie Hills Wind project area contains a total of 597 wetland acres, composed of riverine wetlands (433 acres) and palustrine wetlands (164 acres). The proposed Big Blue Nebraska wind project area contains 504 wetland acres, composed of lacustrine (139 acres), palustrine (289 acres), and riverine (76 acres) wetland types. The Thunderhead project area contains 756 wetland acres, composed of palustrine (644 acres) and riverine (112 acres).

Wetland types present in the study area but not described in FEIS Section 3.4.1 include the following (Cowardin et al. 1979):

- Lacustrine littoral wetlands (L2) include non-deepwater habitats (areas less than 8.2 feet) below low water or to the boundary of nonpersistent emergent, whichever is greater. Dominant vegetation types include emergent vascular and moss species, lichen, shrubs, and trees. Examples of L2 wetlands include playa lakes and permanently inundated lakes and reservoirs.
- Palustrine farmed wetlands (Pf)[1] are small wetlands that have been physically disturbed by agricultural crop production. If left disturbed, wetland vegetation may reestablish in the area.
- Palustrine unconsolidated shore wetlands (PUS) are often adjacent to other wetlands but may also be bordered by uplands, and may be ephemeral, intermittent, or perennial. This wetland type has unvegetated shorelines aside from pioneer species; adjacent vegetation beyond the shoreline will include trees, shrubs, and emergent plants.
- Riverine upper perennial wetlands (R3) and riverine unknown perennial wetlands (R5) have flowing water year-round and are bound within a channel. R3 wetlands have few or no floodplains and vegetation is limited to species that can withstand high water velocity. R5 wetlands are those for which the distinction between lower perennial wetlands and upper perennial wetlands cannot be made via remote sensing and no supplementary data is available. Vegetation adjacent to upper riverine systems is typically forested or scrub-shrub types.

As shown in FEIS Figure 3.4-1, yearly precipitation amounts in Nebraska vary from 14 to 35 inches, with eastern Nebraska receiving the most annual precipitation. Wetland type, acreage, and density reflects this trend, with eastern counties in the study area having more wetlands than the drier west (based on acreage). Differences in acreages of wetlands between the study area counties can be attributed to greater precipitation amounts in eastern Nebraska and the higher number of drainage systems in those counties. Holt County has the most wetland acres due to its location in the sandhills and the presence of two major rivers in the county.

Wetlands in Nebraska are divided spatially into 14 complexes, first described by Gersib (1991). Lagrange (2005) further refined boundaries of the complexes and wetland acreages found therein and identified 7 complexes in need of conservation. Of the 14 complexes, 6 overlap the study area. The Sandhills Wetland complex occurs in the Sandhills Ecoregion, which was discussed in FEIS Section 3.5, *Vegetation*. The remaining five wetland complexes include

[1] The term "farmed wetlands" is synonymous with atypical situations as noted in Chapter 5 of the Great Plains Regional Supplement to the Corps of Engineers Wetland Delineation Manual (USACE 2010).

Southwest Playas (Cheyenne County), Central Table Playas (Custer County), Rainwater Basin (Jefferson and York counties), Sandhills Borders (Holt County), and Niobrara (Holt County) (Lagrange 2022). Characteristics of the Sandhills Borders complex are the same as the Sandhills Wetlands complex and occurs along the Elkhorn and Niobrara Rivers (Lagrange 2022). Common benefits to all complexes include habitat for migratory birds. Threats common to all complexes include alteration by humans such as draining for agriculture, sedimentation, and changes to hydrology (Lagrange 2022).

The Central Table and Southwest Playa complexes occur in central and southwest Nebraska. They are characterized by intermittent small wetlands (less than 5 acres) that are filled by seasonal runoff. Although the geology and topography of the two complexes are different, it is thought that the Central Table Playas could be a historical extension of the Southwest Playas (Lagrange 2022).

The Niobrara River wetland complex occurs along its namesake in northern Nebraska. Wetlands in this complex are a mix of wet meadows and riverine types. Water sources included precipitation runoff and springs (Lagrange 2022; Schneider et al. 2011). In addition to providing migratory bird habitat, the wetlands also support the river through flood and drought mediation, and water filtration (Lagrange 2022).

The Rainwater Basin is a large wetland complex in south-central and southeastern Nebraska. Wetlands in this complex are varied in size and are fed by precipitation runoff. Watersheds tend to be closed in this area, and the clay-based substrate allows wetlands to hold water for longer periods. These wetlands also benefit groundwater recharge and flood mitigation (Lagrange 2022).

Table 3.4-1. Wetland Types in the Related Renewable Energy Projects Study Area by County

Description (Cowardin Type)	Cheyenne		Greeley		Holt		Jefferson		York		Total	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Lacustrine												
Lacustrine limnetic unconsolidated bottom (L1UB)	0.0	-	6.2	100.0	0.0	0.0	437.9	50.3	75.9	100.0	520	19.2
Lacustrine littoral aquatic bed (L2AB)	0.0	-	0.0	0.0	1,680.90	96.1	374.1	43.0	0.0	0.0	2,055.00	76.1
Lacustrine littoral unconsolidated bottom (L2UB)	0.0	-	0.0	0.0	59.5	3.4	0.0	0.0	0.0	0.0	59.5	2.2
Lacustrine littoral unconsolidated shore (L2US)	0.0	-	0.0	0.0	9	0.5	58.2	6.7	0.0	0.0	67.2	2.5
Total Lacustrine	0.0		6.2		1,749.4		870.2		75.9		2,701.7	
Palustrine												
Palustrine aquatic bed (PAB)	112.9	3.0	1,139.70	27.9	2,668.50	1.3	1,396.90	25.1	715.4	10.4	6,113.10	2.8
Palustrine aquatic bed/emergent (PAB/EM)	0.0	0.0	0.0	0.0	568.1	0.3	1.1	0.0	0.0	0.0	569.2	0.3
Palustrine emergent (PEM)	3,171.70	85.6	2,204.80	53.9	194,736.20	96.8	1,807.70	32.5	4,769.10	69.2	207,380.20	93.3
Palustrine emergent/aquatic bed (PEM/AB)	0.0	0.0	0.0	0.0	438.7	0.2	1.2	0.0	0.0	0.0	441	0.2
Palustrine emergent/forested (PEM/FO)	0.0	0.0	0.0	0.0	121.7	0.1	0.0	0.0	0.0	0.0	123.7	0.1
Palustrine emergent/scrub-shrub (PEM/SS)	0.0	0.0	36	0.9	50.9	0.0	0.0	0.0	0.0	0.0	86.9	0.0
Palustrine farmed (Pf)	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.0
Palustrine forested (PFO)	54.8	1.5	257	6.3	620.3	0.3	1,664.70	29.9	781.6	11.3	3,390.00	1.5
Palustrine forested/emergent (PFO/EM)	0.0	0.0	0.1	0.0	49.0	0.0	30.4	0.5	0.0	0.0	79.5	0.0
Palustrine forested/scrub-shrub (PFO/SS)	0.0	0.0	30.9	0.8	168.1	0.1	31.3	0.6	0.0	0.0	230.3	0.1
Palustrine scrub-shrub (PSS)	3.4	0.1	292.9	7.2	1,007.30	0.5	164.0	2.9	21.2	0.3	1,491.90	0.7
Palustrine scrub-shrub/emergent (PSS/EM)	0.0	0.0	2.4	0.1	39.7	0.0	15.0	0.3	0.0	0.0	57	0.0

Description (Cowardin Type)	Cheyenne		Greeley		Holt		Jefferson		York		Total	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Palustrine scrub-shrub/forested (PSS/FO)	0.0	0.0	0.0	0.0	214.6	0.1	0.0	0.0	0.0	0.0	214.6	0.1
Palustrine scrub-shrub/ Unconsolidated shore (PSS/US)	0.0	0.0	0.0	0.0	203.5	0.1	27.0	0.5	0.0	0.0	230.4	0.1
Palustrine unconsolidated bottom (PUB)	27	0.7	19	0.5	223.9	0.1	375.2	6.7	585.8	8.5	1,232.30	0.6
Palustrine unconsolidated shore (PUS)	334.4	9.0	105.6	2.6	67.9	0.0	46.3	0.8	16.5	0.2	596.5	0.3
Palustrine unconsolidated shore/scrub-shrub (PUS/SS)	0.0	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	5.5	0.0
Total Palustrine	3,704.2		4,088.4		201,184.5		5,560.8		6,889.6		221,427.5	
Riverine												
Riverine lower perennial unconsolidated bottom (R2UB)	113.3	3.3	627.2	15.8	3,037.60	30.4	575.2	19.3	378.1	18.2	4,353.30	19.3
Riverine lower perennial unconsolidated shore (R2US)	0.0	0.0	422.2	10.7	2,688.20	26.9	374.9	12.5	18.9	0.9	3,504.20	15.5
Riverine upper perennial unconsolidated shore (R3US)	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	3.4	0.0
Riverine intermittent streambed (R4SB)	3,332.50	95.9	2,782.30	70.3	4,087.50	40.9	1,967.60	65.9	1,634.90	78.7	14,208.80	63.0
Riverine unknown perennial unconsolidated bottom (R5UB)	29.1	0.8	126.1	3.2	184.2	1.8	69.9	2.3	44.6	2.1	483.1	2.1
Total Riverine	3,474.9		3,957.8		10,000.9		2,987.6		2,076.5		22,497.7	

Source: FWS 2023

[a] Cowardin et al. 1979

Table 3.4-2. Wetland Types in the Related Renewable Energy Projects Study Area, Project Areas

Description (Cowardin Type)	Prairie Hills Wind		Big Blue Nebraska		Thunderhead	
	Acres	%	Acres	%	Acres	%
Lacustrine	-					
Lacustrine limnetic unconsolidated bottom (L1UB)	0.0	0.0	58.6	42.2	0.0	0.0
Lacustrine littoral aquatic bed (L2AB)	0.0	0.0	80.3	57.8	0.0	0.0
Total Lacustrine	0.0	0.0	138.9		0.0	0.0
Palustrine						
Palustrine aquatic bed (PAB)	79.7	48.6	23.5	8.1	76.8	11.9
Palustrine emergent/aquatic bed (PEM/AB)	1.1	0.7	0.0	0.0	0.0	0.0
Palustrine emergent/forested (PEM/FO)	2.0	1.2	0.0	0.0	0.0	0.0
Palustrine emergent (PEM)	39.2	23.9	168.2	58.1	561.8	87.3
Palustrine forested (PFO)	11.6	7.0	21.6	7.5	2.8	0.4
Palustrine scrub-shrub (PSS)	3.2	2.0	5.3	1.8	0.0	0.0
Palustrine unconsolidated bottom (PUB)	1.4	0.9	65.4	22.6	1.5	0.2
Palustrine unconsolidated shore (PUS)	25.8	15.7	5.4	1.9	0.6	<0.1
Total Palustrine	164.0		289.4		643.5	
Riverine						
Riverine intermittent streambed (R4SB)	404.0	93.3	72.4	95.8	112.0	100.0
Riverine unknown perennial unconsolidated bottom (R5UB)	29.2	6.7	3.2	4.2	0.0	0.0
Total Riverine	433.2		75.6		112.0	

Source: FWS 2023

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on wetlands would be the same as presented in FEIS Section 3.4.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types of effects of the proposed action on wetlands would be the same as presented in FEIS Section 3.4.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, except for the following differences. Table 3.4-3 summarizes the estimated area of temporary disturbance to wetlands and hydric soils[2] from the proposed action. Under the proposed action, there could be greater temporary disturbances from temporary access roads to some wetland types and hydric soils than estimated for the FEIS proposed action. The proposed action would include the same avoidance and minimization measures (AMMs) described in the FEIS that would reduce the intensity of effects on wetlands. The intensity of these short-term effects would be the same as described for the FEIS proposed action (low to moderate intensity).

The proposed transmission line structures would span wetlands, avoiding any direct, permanent impacts on wetlands and they would be compliant with applicable Clean Water Act (CWA) permitting requirements. There could be long-term impacts from the removal of trees in wetland areas of the right-of-way, the area and exact location of which is unknown, but such effects would be localized. Overall, long-term effects on wetlands would be the same as described for the FEIS proposed action (low intensity).

Table 3.4-3. Estimated Temporary Disturbances to Wetlands, Proposed Action (acres)

Project Activity	Palustrine Emergent	Palustrine Forested	Palustrine Shrub/ Scrub	Riverine (R2, R3, and R5)	Hydric Soils	Total
Construction Yards/Staging Areas	3.8	0.0	0.0	0.0	4.8	8.6
Fly Yards/Assembly Areas	6.0	0.0	0.0	0.0	26.1	32.1
Lattice Tower Work Area	5.3	0.0	0.0	0.0	5.8	11.1
Monopole Work Area	16.1	1.1	0.0	0.4	18.8	36.4
Pulling and Tensioning Sites	18.4	0.0	0.0	0.9	27.5	46.8
Temporary Road	27.5	0.4	<0.1	0.3	34.7	62.9
Total	**77.1**	**1.5**	**<0.1**	**1.6**	**117.7**	**197.9**

Source: FWS 2023

[2] Potential impacts on hydric soils are discussed further in SEIS Section 3.2, *Geology, Mineral Resources, Paleontological Resources, and Soils.*

Alternative A (FEIS Proposed Action)

The effects of Alternative A on wetlands would be the same as presented in FEIS Section 3.4.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures,* and are incorporated into this SEIS by reference. Minor changes in potential acreage disturbed as result of updated wetland delineation boundaries would not change the intensity of effects on wetlands compared to the FEIS.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types of effects of Alternative B on wetlands would be the same as presented in FEIS Section 3.4.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference. Table 3.4-4 summarizes the estimated temporary disturbance to wetlands and hydric soils resulting from Alternative B. Potential effects from temporary disturbance would be greater under Alternative B than the proposed action, but as described for the proposed action, disturbance from construction activities would follow applicable CWA permitting requirements and AMMs would be the same as those described in the FEIS. The overall intensity of short-term effects would be the same as described in the FEIS for Alternative B (low to moderate intensity).

As described for the proposed action, transmission line structures would span wetlands and avoid any direct permanent impacts on wetlands, so long-term effects would be of low intensity under Alternative B.

Table 3.4-4. Estimated Temporary Disturbances to Wetlands, Alternative B (acres)

Project Activity	Palustrine Emergent	Palustrine Forested	Palustrine Shrub-Scrub	Riverine (R2, R3, and R5)	Hydric Soils	Total
Construction Yards/Staging Areas	3.8	0.0	0.0	0.0	4.8	8.6
Monopole Work Area	39.1	1.1	0.0	0.4	44.7	85.3
Pulling and Tensioning Sites	21.1	0.0	0.0	0.9	34.0	56.0
Temporary Road	51.0	0.8	<0.1	0.6	62.8	115.2
Total	**115.0**	**1.9**	**<0.1**	**1.9**	**146.3**	**265.1**

Source: FWS 2023

3.4.2.2 Related Renewable Energy Projects

Construction of the related renewable energy projects could result in both short- and long-term effects on wetlands. While project structures (e.g., wind turbines, solar arrays) would typically not be built on wetlands, associated infrastructure such as access roads, transmission lines, and facilities could directly and indirectly affect wetlands. The types and intensity of effects from construction would be similar to those described for water resources (SEIS Section 3.3), as wetlands typically occur in conjunction with surface water bodies. Potential impacts on wetland vegetation would be similar to those detailed in SEIS Section 3.5, *Vegetation,* and include change in vegetative cover, spread of invasive plants, and exposure to pollutants and hazardous materials.

Construction of the related renewable energy projects could result in disturbance of wetlands, which are present in the related renewable energy projects study area (Tables 3.4-1 and 3.4-2). The amount of disturbance would be project specific and cannot be defined in this SEIS. However, it is possible that the related renewable energy projects would result in temporary or permanent disturbance. This would occur through direct disturbance (i.e., grading, placement of a structure in a wetland) or sedimentation caused by erosion, which would constitute long-term but localized, low- to moderate-intensity effects. Sedimentation could extend beyond the immediate project footprint and cause indirect effects on wetlands, as substrates are carried downstream by water. Siltation can impair wetland function by decreasing water retention and volume, which could indirectly affect wetland vegetation through loss of seed banks and competition with upland species. The duration and intensity of this indirect impact would depend on proximity of the project to the wetland, and on the types of restoration and any AMMs (e.g., SWPPPs and associated BMPs) employed by project developers. Generally, measures to control erosion from construction sites would limit the effects of sedimentation on wetlands to low intensity.

Construction activities could also result in impacts on wetland hydrology, the types and intensity of which would be project specific. Installation of culverts or bridges over drainages could alter hydrology and flow regime, affecting the size of both upstream and downstream wetlands. Access roads could also affect wetlands, and effects could be permanent or temporary, depending on whether access roads are restored following construction or kept indefinitely for maintenance. Construction of buildings or solar arrays could change surface water flow by diverting water or changing runoff and groundwater percolation rates. These changes in hydrology can also lead to changes in wetland vegetation and hydric soils, as both are dependent on the presence of water. Long-term impacts on wetland hydrology would depend on the type and size of the project and infrastructure type and would be of low to moderate intensity.

AMMs implemented for water resources and soils (e.g., SWPPPs and associated BMPs) would also protect wetlands and hydric soils. Developers may adopt other measures to reduce impacts on wetland resources. Additionally, required compliance with state and federal regulations like Executive Order 11990, *Protection of Wetlands,* the *Swampbuster Provisions* of the Food Security Act, and Nebraska Department of Environment and Energy regulations may prevent or reduce the removal of wetlands as part of the permitting process.

Section 3.5
Vegetation

3.5.1 Affected Environment

3.5.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.5.1, *Affected Environment,* about land cover and vegetation types in the study area for the proposed action and alternatives is incorporated by reference into this SEIS with the following differences.

The Nebraska Invasive Species Program (NISP), run by the Nebraska Invasive Species Council, maintains lists of invasive plants found in Nebraska, including the State Noxious, State Watch List, and County Designated lists. FEIS Table 3.5-2 lists noxious weeds and their occurrence for counties in the study area; all but one plant in that table is currently included on either the State Noxious, State Watch, or County Designated lists (NISP n.d.). The perennial pepperwort (*Lepidium latifolium*), listed in the FEIS as State Noxious, has been recategorized as an established invasive plant, meaning that while the plant does not threaten Nebraska resident well-being, it should be prevented from spreading into new areas. Two new plants were added to the State or County lists: plumeless thistle (*Carduus acanthoides*, state noxious), and yellow flag iris (*Iris pseudacorus*, State Watch List Category 2 and County Noxious – Lincoln).

The U.S. Department of Agriculture (USDA) also regulates noxious weeds through the Animal and Plant Health Inspection Service Federal noxious weed program. This program's primary purpose is to prevent introduction of new noxious weed species in the United States and regulates species listed on the Federal Noxious Weed List (USDA 2010). Although none of the species on this list are on the Nebraska State Noxious list, the state list categorizes several federal watch list species as Future Invasive plants, indicating that while the species have no known occurrences in Nebraska, they would pose an ecological risk to the region if introduced. These species include giant salvinia (*Salvinia molesta*), hydrilla (*Hydrilla verticillate*), and water hyacinth species (*Eichhornia* spp.). Additionally, the USDA Federal Seed Act of 1939 (Ch. 615, §1, 53 Stat. 1275.), which prohibits the transportation of noxious plants and seeds between states, maintains a list of prohibited and restricted noxious plants for each state (USDA 2023a). The act also directs the USDA to compile an annual national list of noxious weed seeds (USDA 2023a). Many of these species are included on the 2010 Federal Noxious Weed List. None of the noxious weed seeds listed under the Federal Seed Act national list occur on the Nebraska State Noxious, Watch, or County Designated lists.

3.5.1.2 Related Renewable Energy Projects

Ecoregions

FEIS Section 3.5.1 provides descriptions of four of the five Level III ecoregions that overlap with the related renewable energy project study area: Nebraska Sand Hills, Northwestern Glaciated

Plains, Central Great Plains, and Western High Plains. Tables 3.5-1 and 3.5-2 provide a breakdown of Level III and IV ecoregions by counties in the study area. Of the Level IV ecoregions in these Level III ecoregions that overlap with the study area, the following were described in FEIS Section 3.5.1: Sand Hills (Nebraska Sand Hills Level III Ecoregion), Wet Meadow and Marsh Plain (Nebraska Sand Hills Level III Ecoregion), and Lakes Area (Nebraska Sand Hills Level III Ecoregion). Other Level IV ecoregions in the study area include the following.

- **Flat to Rolling Plains (Western High Plains Level III Ecoregion):** This ecoregion, located in northwestern Nebraska including portions of Cheyenne County, consists of extensive dryland farming with areas of irrigated cropland agriculture, mainly winter wheat. This area is generally smoother and more level than other portions of the Western High Plains Level III Ecoregion.
- **Pine Bluffs and Hills (Western High Plains Level III Ecoregion):** This ecoregion, located in northwestern Nebraska including a small portion of Cheyenne County, consists of bluffs, escarpments, and areas of exposed bedrock, and supports mixed-grass prairie and Ponderosa pine woodlands on ridge tops and side slopes.
- **Smoky Hills (Central Great Plains Level III Ecoregion):** This ecoregion, located mostly in Kansas with a small portion extending into southeastern Nebraska in Jefferson and Gage counties, consists of an undulating to hilly dissected loess plains with sandstone hills. Natural vegetation in this area ranges from tallgrass prairie in the east to mixed-grass prairie in the west, and the primary land uses are cropland and grassland.
- **Central Nebraska Loess Plains (Central Great Plains Level III Ecoregion):** This ecoregion, located in central Nebraska including portions of Custer County and Greeley County, consists of rolling dissected plains. Natural vegetation in this ecoregion includes mixed-grass prairie and areas of red-cedar savanna intrusion in the west, but land use/land cover includes a mosaic of rangeland and cropland. Irrigated agriculture is increasing in this region.
- **Rainwater Basin Plains (Central Great Plains Level III Ecoregion):** This ecoregion, located in southeastern Nebraska including portions of Jefferson and York Counties, consists of flat to rolling loess-covered plains and includes one of the largest concentrations of natural wetlands found in Nebraska. This ecoregion also includes cropland agriculture practices and extensive irrigation.
- **Southern River Breaks (Northwestern Glaciated Plains Level III Ecoregion):** This ecoregion, which includes small portions of northeastern Nebraska including parts of Holt County, is an extension of a larger region in South Dakota and consists of dissected hills and high relief canyons bordering rivers and associated alluvial plains. This region contains a combination of riparian vegetation, mixed-grass prairie, and scattered woodlands and provides excellent habitat for wildlife.
- **Holt Tablelands (Northwestern Glaciated Plains Level III Ecoregion):** This ecoregion, which includes small portions of northeastern Nebraska including parts of Holt County, is a transitional area between the loamy, glaciated regions with loess soils to the east and the

sandhills to the west and south. It includes cropland agriculture on the more level tablelands and in areas with loamy soils and grassland in areas of greater relief.

A small portion of the study area also overlaps with the Northwestern Great Plains Level III Ecoregion, which overlaps with parts of southeastern Montana, southwestern South Dakota, northwestern North Dakota, northeastern Wyoming, and a small portion of Nebraska along the state's northern border. Theis ecoregion consists of semiarid, rolling plains with occasional buttes and badlands and contains rangelands and wheat and alfalfa farming, with some native grasslands. Agriculture is limited by precipitation patterns (Chapman et al. 2001).

In the Northeastern Great Plains Level III Ecoregion, the Niobrara River Breaks Level IV Ecoregion overlaps with the study area. This ecoregion consists of mixed-grass and sandhills prairies and woody vegetation from the central hardwoods, northern hardwoods, and the Rocky Mountain forests. This ecoregion contains a variety of forest stand types and provides generally good wildlife habitat (Chapman et al. 2001).

Land Cover Types

Land cover types present in the related renewable energy projects study area are categorized into groups and described below. Tables 3.5-3 and Table 3.5-4 show the acreage of each land cover group in the study area.

- **Grassland and Prairie:** Grassland and prairie land cover types make up approximately 24% of the study area. Specific land cover groups include Central Great Plains Mixedgrass Prairie, Central Tallgrass Prairie, Northwestern Great Plains Mixedgrass Prairie, Western Great Plains Shortgrass Prairie, and Western Great Plains Tallgrass Prairie. The Western Great Plains Shortgrass Prairie, Central Mixedgrass Prairie, and Western Great Plains Tallgrass Prairie systems are described in FEIS Section 3.5.1.4, *Grassland/Prairie,* so this section only describes the Central Tallgrass Prairie and the Northwestern Great Plains Mixedgrass Prairie groups.
    - The Central Tallgrass Prairie system extends from eastern Kansas and Nebraska to northwestern Indiana. It has more mesic soils than other adjacent prairie systems. It is dominated by tallgrass species such as big bluestem (*Andropogon gerardii),* Indiangrass *(Sorghastrum nutans)*, and switchgrass (*Panicum virgatum)* and typically also contains other midgrass and shortgrass species, such as sideoats grass (*Bouteloua curtipendula),* porcupine grass *(Hesperostipa spartea),* and little bluestem (*Schizachyrium scoparium),* especially on slopes or drier areas. Fire, drought, and grazing are the primary natural dynamics influencing this system, but it has been heavily developed with agriculture and few natural areas remain.
    - The Northwestern Great Plains Mixedgrass Prairie system extends from northern and western Nebraska into southern Canada, and west to central Montana and eastern Wyoming. Its defining environmental descriptor is fine and medium-textured soils that do not include sand, loamy sand, or sandy loam soils. This system is often located near the Western Great Plains Sand Prairie, which contains coarser soils. The most common vegetation includes western wheatgrass (*Pascopyrum smithii),* green needlegrass *(Nassella viridula)*, and sideoats grama (*Bouteloua curtipendula). S*treambank

wheatgrass *(Elymus lanceolatus),* plains muhly *(Muhlenbergia cuspidata)*, and bluebunch wheatgrass (*Pseudoroegneria spicata)* are also common. This is a highly disturbed system (due to widespread grazing as well as drought and fire).

- **Agricultural:** Agricultural land cover types make up approximately 48% of the study area, with row crops making up over half of the total agricultural area.
- **Dune Vegetation:** Dune vegetation, including sand prairie and sand shrubland, makes up approximately 17% of the study area. Specific land cover types in this category include Western Great Plains Sand Prairie and Western Great Plains Sand Hill Steppe, both of which are described in FEIS Section 3.5.1.1, *Dune Vegetation*.
- **Developed, Barren, and Sparsely Vegetated:** These areas make up approximately 5% of the study area and include low-, medium-, and high-intensity developed lands, roads, quarries, strip mines, gravel pits, well and wind pads, and sparsely vegetated areas. This category also includes urban and developed forests and shrublands.
- **Forested:** Forested land cover types make up approximately 1% of the study area. Specific land cover types in this group include ponderosa pine forest, woodland and savanna; ruderal forest; bur oak woodland and savanna; and white oak/red oak/hickory forest and woodland.
- **Riparian Areas, Wetlands, and Floodplains:** These land cover types make up about 6% of the study area. This group includes wetlands, marshes, and floodplain forest.
- **Open Water**: Open water, such as rivers and lakes, makes up 0.4% of the study area.

Table 3.5-1. Level III and IV Ecoregions in the Related Renewable Energy Projects Study Area, by County

Level III Ecoregion	Level IV Ecoregion	Cheyenne	Greeley	Holt	Jefferson	York	Total Acres	% of Total Acres
Western High Plains	Flat to Rolling Plains	723,661	0	0	0	0	723,661	14.3%
	Pine Bluffs and Hills	41,526	0	0	0	0	41,526	0.8%
						Total	**765,187**	**15.1%**
Central Great Plains	Smoky Hills	0	0	0	68,615	0	68,615	2.0%
	Central Nebraska Loess Plains	0	256,593	0	0	0	256,593	7.5%
	Rainwater Basin Plains	0	0	0	299,684	368,263	667,947	19.6%
						Total	**993,155**	**29.1%**
Northwestern Glaciated Plains	Southern River Breaks	0	0	24,023	0	0	24,023	0.7%
	Holt Tablelands	0	0	568,876	0	0	568,876	16.7%
						Total	**592,899**	**11.7%**
Northwestern Great Plains	Niobrara River Breaks	0	0	10,919	0	0	10,919	0.3%
						Total	**10,919**	**0.2%**
Nebraska Sand Hills	Sand Hills	0	108,358	184,266	0	0	292,624	8.6%
	Wet Meadow and Marsh Plain	0	0	719,631	0	0	719,631	21.1%
	Lakes Area	0	0	38,917	0	0	38,917	1.1%
						Total	**1,051,172**	**30.8%**

Source: EPA 2012

Table 3.5-2. Level III and IV Ecoregions in the Related Renewable Energy Projects Study Area, Project Areas

Level III Ecoregion	Level IV Ecoregion	Big Blue Nebraska	Prairie Hills Wind	Thunderhead	Total Acres	% of Total Acres
Central Great Plains	Central Nebraska Loess Plains	0.0	40,964.6	0.0	40,964.6	33.5
	Rainwater Basin Plains	20,543.2	0.0	0.0	20,543.2	16.8
Nebraska Sand Hills	Sand Hills	0.0	0.0	831.8	831.8	0.7
	Wet Meadow and Marsh Plain	0.0	0.0	60,056.8	60.056.8	49.0
TOTAL					**122,396.8**	**25.8%**

Source: EPA 2012

Table 3.5-3. Land Cover Types in the Related Renewable Energy Projects Study Area, by County

	Cheyenne		Greeley		Holt		Jefferson		York		Study Area	
Land Cover Type	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Grassland and Prairie	251,437.1	32.9	153,807.9	42.1	289,104.4	18.7	79,182.4	21.5	10,293.9	2.8	783,866.5	23.0
Agricultural	475,005.2	62.1	143,774.2	39.4	453,131.8	29.3	238,363.2	64.8	321,585.5	87.3	1,631,943.3	47.8
Dune Vegetation	523.9	0.1	38,628.1	10.6	552,316.7	35.7	0.0	0.0	0.0	0.0	591,534.2	17.3
Riparian/Wetland, and Floodplain	1,257.7	0.2	8,191.4	2.2	160,212.0	10.4	14,887.5	4.0	8,510.1	2.3	193,073.8	5.7
Developed, Barren, and Sparsely Vegetated	36,426.6	4.8	16,688.8	4.6	60,196.2	3.9	22,518.4	6.1	25,129.1	6.8	161,092.2	4.7
Open Water	110.8	0.0	1,547.9	0.4	7,381.2	0.5	2,608.9	0.7	1,542.5	0.4	13,255.2	0.4
Forested	425.9	0.1	2,313.6	0.6	24,060.4	1.6	10,557.0	2.9	1,201.7	0.3	38,567.3	1.1

Source: LANDFIRE 2020

Table 3.5-4. Land Cover Types in the Related Renewable Energy Projects Study Area, Project Areas

	Big Blue Nebraska		Prairie Hills Wind		Thunderhead		Total	
Land Cover Type	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Grassland and Prairie	2,413.9	11.8	31,398.4	76.6	4,715.9	7.7	38,528.2	31.5
Agricultural	16,359.6	79.6	7,118.8	17.4	45,230.0	74.3	68,708.4	56.1
Dune Vegetation	0.0	0.0	0.0	0.0	6,923.4	11.4	6,923.4	5.7
Riparian/Wetland, and Floodplain	427.5	2.1	603.5	1.5	748.6	1.2	1,779.6	1.4
Developed, Barren, and Sparsely Vegetated	1,029.5	5.0	1,699.2	4.1	2,972.1	4.9	5,700.8	4.7
Open Water	190.1	0.9	31.8	0.1	19.1	0.1	241.0	0.2
Forested	123.0	0.6	112.7	0.3	280.0	0.4	515.7	0.4

Source: LANDFIRE 2020

Noxious Plants

Table 3.5-5 lists the noxious plant species known to occur in the related renewable energy projects study area (including state noxious species and state watch list species) and the counties with known occurrences. FEIS Section 3.5.1 describes the state authorities in charge of noxious weed control in Nebraska.

Table 3.5-5. Noxious Plants and Occurrence in the Related Renewable Energy Projects Study Area

Common Name[a]	Scientific Name[a]	Status and Known County Occurrences[b]
Canada thistle	*Cirsium arvense*	State noxious (all counties) [a]
Common mullein	*Vebascum thapsus*	County designated (Cheyenne)[b]; Known occurrence (Holt, Greeley, Jefferson)[d]
Field bindweed	*Convolvulus arvensis*	State Watch List (Priority) (all counties)[c], County designated (Cheyenne)[c]; Known occurrence (Holt, Greeley, Jefferson, York)[d]
Diffuse knapweed	*Centaurea diffusa*	State noxious; Known occurrence (Antelope, Greeley, Holt, Wheeler)[e]
Houndstongue	*Cynoglossum officinale*	State Watch List (Category 2); Known occurrence (Holt)[d]
Eurasian common reed (Phragmites)	*Phragmites australis* ssp. a*ustralis*	State noxious; Known occurrence (Holt, Lincoln, Wheeler)[f]
Leafy spurge	*Euphorbia esula*	State noxious; Known occurrence (all counties)[g]
Musk thistle	*Carduus nutans*	State noxious; Known occurrence (Antelope, Custer, Holt, Jefferson, York)[d h]
Plumeless thistle	*Carduus acanthoides*	State noxious (all counties); Known occurrence (Antelope, Custer, Jefferson, York)[d]
Purple loosestrife (cultivars and hybrids)	*Lythrum salicaria*	State noxious; Known occurrence (Holt, Lincoln)[i]
Saint Johnswort	*Hypericum perforatum*	State Watch List (Category 2); Known occurrence (Jefferson, Lincoln)[d]
Saltcedar	*Tamarix ramosissima*	State noxious (all counties); Known occurrence (Lincoln)[d]
Scotch thistle	*Onopordum acanthium*	County designated (Cheyenne)[b]
Sulfur cinquefoil	*Potentilla recta*	State Watch List (Category 2); Known occurrence (Holt, Wheeler)[d]
Spotted knapweed	*Centaurea stoebe* ssp. m*icranthos*	State noxious; Known occurrence (Antelope, Greeley, Holt, Wheeler)[e]

[a] State noxious weeds are subject to the Nebraska Department of Agriculture's Noxious Weed Program.
[b] County designated species are defined as noxious weeds at the county level (Nebraska Cooperative Fish & Wildlife Research Unit 2023).
[c] State Watch List species are identified in the Nebraska Invasive Species Program based on invasiveness in surrounding states and increasing range in Nebraska.
[d] USDA n.d.
[e] Gaussoin et al. 2010
[f] Knezevic et al. 2008
[g] Sandell and Knezevic 2011
[h] Roeth et al. 2003
[i] Knezevic 2003

3.5.2 Environmental Consequences

3.5.2.1 Proposed Action and Alternatives

No Action

The effects of the no action alternative on vegetation would be the same as presented in FEIS Section 3.5.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on vegetation would be the same as presented in FEIS Section 3.5.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, except for the following differences.

Table 3.5-6 shows the estimated area of temporary disturbance by land cover type associated with the proposed action. As was the case for the FEIS proposed action, dune vegetation land cover types represent the largest portion of the temporary disturbance area. The area in which temporary, construction-related effects on vegetation would occur would be greater by 270 acres than anticipated for the FEIS proposed action due to changes in the estimates of temporary disturbance. However, these short-term effects on vegetation would align with a moderate level of intensity, as described in the FEIS. Permanent disturbance is estimated to constitute approximately 27 acres, but the specific location of this permanent disturbance is unknown. Long-term effects on vegetation would be the same as described for the FEIS proposed action (low to moderate intensity).

Alternative A (FEIS Proposed Action)

The effects of Alternative A on vegetation would be the same as presented in FEIS Section 3.5.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on vegetation would be the same as presented in FEIS Section 3.5.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference, with the following differences.

Table 3.5-7 shows the estimated area of temporary disturbance by land cover type associated with Alternative B. The area in which temporary, construction-related effects on vegetation would occur would be greater than that anticipated for the proposed action but, like the proposed action, dune vegetation land cover types represent the largest portion of the temporary disturbance area. However, these short-term effects on vegetation would align with a moderate level of intensity, as described in the FEIS for Alternative B. Permanent disturbance is estimated to constitute approximately 27 acres, but the specific location of this permanent disturbance is unknown. Long-term effects on vegetation would be the same as described in the FEIS for Alternative B (low to moderate intensity).

Table 3.5-6. Estimated Area of Temporary Disturbance by Land Cover Type[1], Proposed Action (acres)

	Agricultural	Dune Vegetation	Forested	Developed	Grassland, Shrubland, Prairie	Open Water	Riparian and Wetland	Total
Construction Yards/Staging Areas	18.4	33.1	0.0	19.7	12.7	-	0.2	84.2
Fly Yards/Assembly Areas	11.9	205.2	0.0	9.9	40.1	-	11.5	278.7
Lattice Tower Work Area	0.5	122.5	0.0	3.3	8.9	-	2.3	137.4
Monopole Work Area	58.6	81.9	0.0	87.4	23.3	0.0	10.9	262.2
Pulling and Tensioning Sites	42.1	215.4	0.4	59.9	27.8	0.1	13.3	359.0
Temporary Access Road	25.1	378.5	0.4	69.3	36.7	0.3	16.5	526.7
Total Temporary Disturbance	**156.7**	**1,036.6**	**0.8**	**249.5**	**149.6**	**0.3**	**54.8**	**1,648.2**

Source: LANDFIRE 2020

[1] Land cover types were analyzed at the collapsed vegetation type level and grouped in this table to match the categories presented in FEIS Table 3.5-3.

Table 3.5-7. Estimated Area of Temporary Disturbance by Land Cover Type[1], Alternative B (acres)

	Agricultural	Dune Vegetation	Forested	Developed	Grassland, Shrubland, Prairie	Open Water	Riparian and Wetland	Total
Construction Yards/Staging Areas	18.4	33.1	0.0	19.7	12.7	-	0.2	84.2
Monopole Work Area	60.1	559.9	0.0	100.8	59.3	0.0	24.1	804.2
Pulling and Tensioning Sites	41.1	281.3	0.8	65.9	33.5	0.1	17.8	440.4
Temporary Road	47.2	666.5	0.8	129.7	64.9	0.5	30.0	939.7
Total Temporary Disturbance	**166.9**	**1,540.8**	**1.6**	**316.2**	**170.4**	**0.6**	**72.2**	**2,268.5**

Source: LANDFIRE 2020

[1] Land cover types were analyzed at the collapsed vegetation type level and grouped in this table to match the categories presented in FEIS Table 3.5-4.

3.5.2.2 Related Renewable Energy Projects

Change in Vegetation Cover

Construction of the related renewable energy projects would result in the removal of vegetation, primarily from clearing required for site access and preparation and wind turbine, tower, and solar panel construction. Construction of wind turbines, towers, solar panels, and associated permanent access routes would require the permanent conversion of some vegetation, resulting in vegetative cover loss and fragmentation. Most disturbance for these projects would be temporary and vegetation would regrow following construction, but some vegetation would be removed for the life of the project to accommodate wind turbines, solar panels, and associated infrastructure.

Effects would primarily be localized to the construction site, with the specific extent of effects varying depending on the size of the project and existing conditions at the project site. Effects would also be dependent on project standard operating and maintenance procedures.

The extent of long-term effects from vegetation conversion would depend on the underlying vegetation type. For example, forested land cover may be permanently removed from the area surrounding a wind project, whereas grasslands or agricultural land cover types would be allowed to regrow and return to its previous condition. Vegetation at solar projects may shift to more shade tolerant species, particularly under panels. The duration of impacts would also depend on the land cover types present at project sites; some land cover types would take longer to regrow. Generally, both short-term and long-term effects on vegetation cover would be of low to moderate intensity.

Invasive Plants

Construction of wind and solar projects could result in the spread or introduction of nonnative invasive species to project sites and adjacent vegetation communities, primarily from vehicle transportation to and from construction sites and land clearing required for site preparation. Nonnative, invasive species can outcompete native vegetation, lowering biodiversity and degrading ecosystem function. The severity of effects on native vegetation would vary depending on the characteristics of the invasive species introduced to an area and the vegetation restoration/invasive plant control the developers implement. Generally, effects of invasive plants would be of low to moderate intensity.

Exposure to Pollutants and Hazardous Materials

Potential pollutants and hazardous materials associated with the proposed action include chemicals used for cleaning equipment and solar arrays, herbicides and pesticides, vehicle fuels and fluids, and materials contained in the wind turbine and solar equipment. Vegetation could be harmed or killed by accidental or incidental exposure (i.e., spills, leaks, water runoff) and direct application of chemicals (e.g., herbicide and pesticides). Effect duration and severity would be dependent on the type of exposure. Use of herbicides and pesticides would be controlled and applied to specific locations (e.g., roadsides, near buildings). Standard operating

and maintenance procedures and mitigation plans (e.g., Storm Water Pollution Prevention Plans [SWPPPs] and associated BMPs) would reduce spills and provide guidance on proper clean-up of pollutants and hazardous materials. Generally, effects of pollutants and hazardous materials on vegetation would be of low intensity.

Erosion and Fugitive Dust

Construction of the related renewable energy projects could result in changes to soil quality near facilities and support infrastructure. Exposed unvegetated areas (i.e., support roads, near and under facilities) can increase erosion and increase fugitive dust. Operating and mitigation procedures to reduce dust and revegetate areas would reduce these effects. Fugitive dust can lead to decreased plant function and growth by reducing physiological functions and reducing nutrient production and intake. Erosion and sedimentation can remove or cover plants and seeds. The duration and severity of effects would depend on the extent of disturbance. Developers are assumed to implement SWPPPs and associated BMPs, which would reduce effects related to erosion and fugitive dust. Generally, effects of erosion and fugitive dust on vegetation would be of low intensity.

Loss of Pollinators

Construction of wind turbines and solar panel arrays could lead to a temporary decrease in local pollinators as habitat is removed during construction. Decreases in pollinators could reduce plant production and gene flow between populations. Many plants cannot reproduce without pollen carried to them by foraging pollinators (USDA 2023b). Effects would be temporary and would dissipate as plants reestablish in revegetated work areas. Effects would be further decreased if mitigation and site restoration plans include reseeding of native flowering plants. Any measures that control usage and type of pesticide would also decrease effects on local pollinators. Effects of the loss of pollinators on vegetation would be of low intensity.

Section 3.6
Wildlife

3.6.1 Affected Environment

3.6.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.6.1, *Affected Environment*, regarding wildlife in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.6.1.2 Related Renewable Energy Projects

The following sections describe wildlife resources in the related renewable energy projects study area, including wildlife habitat and species. Approximately 48% of the study area consists of developed croplands with limited suitability for wildlife (Table 3.5-3). In areas where agricultural land cover is predominant, wildlife habitat primarily occurs either in edges such as windrows and adjacent riparian corridors, or from species directly utilizing the croplands. As noted in Table 3.5-3, approximately 40% of the study area is grassland and prairie or dune vegetation, mostly in Cheyenne, Greeley, and Holt counties.

Ecoregions

SEIS Section 3.5, *Vegetation*, describes the ecoregions in the related renewable energy projects study area. York and Jefferson Counties and the proposed Prairie Hills and Big Blue Nebraska project areas are in the Central Great Plains Ecoregion; Greeley County is in the Mixed-grass Prairie Ecoregion; Holt County is in the Northwestern Glaciated Plains, Northwestern Great Plains, and Nebraska Sand Hills Ecoregions; and Cheyenne County is in the Western High Plains Ecoregion. The Thunderhead Wind Energy Center (Thunderhead) project area, which intersects Antelope, Hope, and Wheeler counties, is in the Nebraska Sand Hills Ecoregion.

Biologically Unique Landscapes

To identify remaining natural landscapes for priority habitat management and conservation efforts, the Nebraska Natural Legacy Project has identified a series of Biologically Unique Landscapes (BULs) throughout the state, based on occurrences of at-risk species and unique natural communities. If effectively managed, targeted conservation of BULs could conserve most of the state's biological diversity (Schneider et al. 2011).

BULs designated by the Nebraska Natural Legacy Project that fall in the related renewable energy projects study area include the following.

- **Central Loess Hills:** This BUL occurs in Custer County and occupies the Loess Hills region of central Nebraska. It includes the rolling to steep Loess Hills, now a mosaic of mixed-grass prairie and cropland. Flatter tablelands in this BUL are used by waterbirds during migration. Stressors to fish and wildlife species and habitats in the Central Loess Hills BUL

include unsustainable grazing practices, invasive plants, sedimentation and drainage of playa wetlands, invasive plant species, conversion to cropland, and poorly sited utility-scale wind turbines (Schneider et al. 2011).

- **Elkhorn River and Headwaters:** This BUL is described in FEIS Section 3.6.1.2, *Biologically Unique Landscapes*, and occurs in Holt County.
- **Lower Niobrara River:** This BUL occurs in Holt County and includes a two-mile buffer from the Lower Niobrara River. This reach of the Niobrara River has fairly natural flows and sandbars supporting nesting shorebirds. Stressors to fish and wildlife species and habitats in the Lower Niobrara River include invasive species, lack of wildfire, water diversions, and continued home development on riverbanks (Schneider et al. 2011).
- **Rainwater Basin:** This BUL occurs in southern Nebraska, south of the Platte River, and overlays all of York County and the northwest corner of Jefferson County. The surface water drainage system is poorly developed, and many watersheds drain into low-lying wetlands. Most of the historical wetlands in this area have been farmed sometime during the last century, with less than 10% of historical wetlands remaining. The Rainwater Basin has been recognized as a significant migratory bird area and serves as a concentration point in the central flyway for migrating ducks, geese, and shorebirds. Stressors to fish and wildlife species and habitats in the Rainwater Basin BUL include drainage or filling of wetlands, sedimentation and chemical runoff into wetlands, invasive plant species, lack of fire on the landscape, and poorly sited transmission line or wind farm development (Schneider et al. 2011).
- **Sandstone Prairies:** This BUL occurs in southwest Jefferson County, generally south or west of Fairbury. Soils in some parts of the area are shallow and derived from sandstone, with limited agricultural development in many areas. Large blocks of native tallgrass prairie still remain, often interspersed with cropland. Much of the land within this BUL in Jefferson County is existing cropland. Stressors to fish and wildlife species and habitats in the Sandstone Prairies include conversion to cropland, unsustainable grazing practices, lack of fire, invasive plants, and poorly sited utility-scale wind turbines (Schneider et al. 2011).
- **Upper Loup River:** This BUL is described in FEIS Section 3.6.1.2, *Biologically Unique Landscapes*, and occurs in Greeley County.
- **Verdigris – Bazile**: This BUL occurs in Holt County. This area in northeast Nebraska consists of a mosaic of cropland, restored native grasslands, native tallgrass and mixed-grass prairie, and exotic cool-season grasslands. Many of the native prairies are degraded from lack of fire and specific livestock grazing practices that reduce native plant species diversity and promote exotic plants (Schneider et al. 2011).

Species

The resident and migratory species of the Central Great Plains, Northwestern Glaciated Plains, and Western High Plains Ecoregions are generally similar to those that occur in Nebraska Sand Hills Ecoregion and are discussed in FEIS Section 3.6.1, *Affected Environment*, though there is potential for differing dominant species. FEIS Section 3.6.1 specifically notes that most mammal, reptile, and amphibian species are widespread, with no distinct affiliation to the Nebraska Sand

Hills Ecoregion. FEIS Section 3.6.1 also describes that over 350 resident and migratory bird species, including game species, are known to occur in the Nebraska Sand Hills Ecoregion. This represents most of the known bird diversity in Nebraska and applies to the related renewable energy projects study area. The *Checklist of the Birds of Nebraska* (Nebraska Ornithologists' Union 2023) has documented 467 species in the entire state. Of the 467 species, 114 are well outside of their normal range, with 95 classified as accidental (acceptably reported in 0–2 of the past 10 years) and 19 as casual (acceptably reported in 4–7 of the past 10 years). The list also includes five species that are extirpated in Nebraska or extinct.

Thirteen species of amphibians and forty-seven species of reptiles are native to Nebraska, with most of these species having the potential to occur in the related renewable energy projects study area because of its large spatial distribution across Nebraska. Nebraska is home to approximately 89 species of mammals. Because of the large spatial extent of the related renewable energy projects, most species have the potential to occur somewhere in the study area. Nebraska is home to more than 100 species of fish, 78 of which are presumed to be native. The related renewable energy projects will generally avoid riverine habitat for fish but may intersect with their habitat at crossing locations.

As noted, portions of the study area contain extensive croplands with restricted suitability for wildlife. Species using cropland as habitat are primarily limited to foraging insectivorous birds and bats, seed-eating birds predating crops, species such as snow goose and sandhill crane that glean from harvested fields, raptors predating the aforementioned species, and ducks, geese, and shorebirds utilizing flooded depressions in fields.

3.6.2 Environmental Consequences

3.6.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on wildlife would be the same as presented in FEIS Section 3.6.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on wildlife would be the same as presented in FEIS Section 3.6.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference, with the following differences.

The proposed action includes a reroute of the proposed transmission line, which would result in slightly different impacts on vegetation communities and associated wildlife habitat, as described in SEIS Section 3.5, *Vegetation*. However, this reroute would not change the types or intensity of effects on wildlife described for the FEIS proposed action.

The proposed action also includes line marking devices on the overhead shield wire along all 226 miles of the proposed transmission line, with avian flight diverters with reflective and glow-in-the-dark surfaces in areas with high avian densities, such as river crossings (Revised

HCP Section 4.1.3). Line marking devices would also be installed on 124 miles of NPPD-owned power lines in the whooping crane 95% sighting corridor. This would reduce the anticipated intensity of impacts from injury and mortality from colliding with the R-Project transmission line and other NPPD-owned power lines.

Under the proposed action, NPPD would no longer implement avoidance and minimization measures (AMMs) included in the previous HCP and FEIS proposed action to mow areas of disturbance and remove carcasses from the project area to discourage ABB use. SEIS Section 3.7, *Special Status Species*, explains why these AMMs were removed from the Revised HCP. Removing these AMMs reduces the potential for disturbing or harming wildlife in mowed areas or reduce food resources for certain species by removing carcasses, reducing potential adverse effects on wildlife species compared to the FEIS proposed action.

Overall, these differences would not change the overall duration or intensity of effects described for the FEIS proposed action (short and long term; low to moderate intensity).

Alternative A (FEIS Proposed Action)

The effects on wildlife under Alternative A would be the same as presented in FEIS Section 3.6.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on wildlife would be the same as presented in FEIS Section 3.6.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference, with the following differences. Like the proposed action, Alternative B includes a minor reroute, added line marking, and the removal of certain AMMs for ABB, for which the same effects would occur under Alternative B. Overall the duration and intensity of effects would be the same as described in the FEIS for Alternative B (short and long term; low to moderate intensity).

3.6.2.2 Related Renewable Energy Projects

The types of effects on wildlife from construction of the related renewable energy projects are the same as those described in the FEIS for the proposed action and alternatives and primarily include the following.

- Injury or mortality to individuals from being crushed by construction and maintenance equipment and vehicles.
- Disturbance from construction and maintenance activities, including the presence of construction personnel and equipment.
- Temporary or permanent loss of habitat from disturbance to land cover (SEIS Section 3.5) from the development of related renewable energy project facilities.

Temporary and permanent habitat loss from the development of related renewable project facilities (e.g., photovoltaic panels, wind turbines) and associated disturbance and loss of

vegetation (SEIS Section 3.5). The duration and intensity of these effects would depend mostly on the siting of these projects in relation to wildlife habitat. Related renewable energy projects could also fragment habitat by disturbing contiguous habitat and creating barriers to wildlife movement and could degrade habitat by increasing the potential for establishment and/or spread of nonnative, invasive vegetation species. The duration and intensity of these impacts would depend mostly on the siting of the related renewable energy projects. Projects sited in croplands or other areas already converted from natural land cover would generally have a lower intensity of effect than projects sited in natural land cover or in the vicinity of natural land cover supporting important wildlife habitat, such as riparian corridors, migratory stopover sites, or BULs.

Operation of wind turbines constitutes a long-term collision risk to bats and birds, given that Nebraska, including the related renewable projects study area, is in the Central Flyway migration corridor, which includes high-use bird areas for overwintering, spring and fall migrant, and nesting migratory birds. Given the projects' location within the Central Flyway, wind energy facilities in the study area would likely result in higher levels of collision mortality for migratory passerines than facilities sited outside major bird migration corridors. Potential collision risks associated with wind projects are discussed in FEIS Section 4.4.3, *Wildlife*, and are incorporated by reference. Resident and migratory passerine species are the most common group of birds killed at most wind energy projects, often making up more than 80% of reported fatalities (NWCC 2001). Nocturnal migrant species may be at higher risk of collision with wind turbines because of limited visibility (NWCC 2001).

The proposed Prairie Hills Wind project in Custer County would include up to 89 turbines situated in an approximately 41,000-acre project area. The proposed Big Blue Nebraska wind project area in Jefferson County would include up to 90 turbines situated in an approximately 120,000-acre project area. Both projects are located at the intersection of the Mississippi and Central flyways (FEIS Figure 3.6-3) and therefore have elevated risk of collision with birds. The proposed Big Blue Nebraska project area is dominated by agricultural land cover (e.g., row crops) (Table 3.5-3). Bats may forage less over agricultural areas, because of decreased insect abundance from pesticide application, resulting in less potential for bat strikes. Bat species may still encounter wind turbines during migration. The proposed Prairie Hills Wind project area encompasses mostly grassland and prairie land cover types, as well as over 600 acres of riparian/wetland and floodplain landcover types (Table 3.5-3), representing a higher proportion of undisturbed wildlife habitat that could be indicative of a higher abundance of native wildlife species potentially affected by wind energy development.

The Thunderhead project in Antelope, Holt, and Wheeler counties has already been constructed, and would therefore have no additional impacts from construction. Completion of the R-Project would allow for increased operational capacity at Thunderhead, resulting in additional spinning time for rotor blades, and additional collision risk for bats and birds in the rotor swept area. At its fully operational capacity of 300 MW, Thunderhead is estimated to result in 21 to 2,730 bird strike fatalities and 60 to 5,700 bat strike fatalities annually over the 50-year project lifetime (WAPA 2022). Thunderhead has established a Bird and Bat Conservation Strategy to minimize collisions below these estimates.

Wind energy project developers would be required to comply with the Endangered Species Act with respect to listed species that occur in the related renewable energy projects study area (SEIS Section 3.7), which would also reduce impacts on other wildlife species.

The installation of additional electrical transmission lines to support the related renewable energy projects would result in additional long-term collision risk to birds and a potential electrocution risk to large birds, including raptors (depending on spacing of wires). Transmission lines in prairie and grassland habitat result in additional perches for raptor species, potentially increasing foraging success for predator species and increasing the risk of predation on small mammals, ground-dwelling birds, and other terrestrial species. Effects would be long term and the intensity would depend on the siting of the related renewable energy projects in relation to wildlife habitat.

The intensity of effects on wildlife from wind energy development would depend on the siting and footprint of project facilities and rotor-swept area, along with other site- and project-specific characteristics. The intensity of impacts would also depend on the types of AMMs that would be implemented for each project. Overall, the species with greatest potential to be affected by the related wind projects are raptors, passerines, and migratory tree-roosting bats. Given extent of the new wind energy development that is foreseeable and related to the R-Project (over 1,000 MW of new capacity) effects on wildlife species would be long term in duration and low intensity, potentially rising to moderate intensity for species with a higher risk of mortality from wind turbine collisions.

Future related solar energy projects are identified in York and Cheyenne counties (Table 3.1-3). Construction of solar projects has similar effects from habitat conversion to wind projects, but these effects generally occur with large, contiguous footprints. If sited in natural habitat, this can result in loss of large blocks of natural habitat. The contiguous nature of solar projects also allows them to be placed in previously disturbed areas (active agriculture/row crops), avoiding direct impacts on natural habitats. Solar projects sited in former farmlands also result in beneficial effects from fallowing: lack of ploughing allows for development of soil biology; lack of farming allows ground-nesting birds to nest with little risk of crushing; increased year-round cover reduces sediment runoff; and water quality in the region may be improved from the reduction in non-point source fertilizer, herbicide, and pesticide runoff. These long-term effects reduce stressors on aquatic and ground-dwelling species and would potentially be beneficial.

Related renewable energy project actions that result in loss, fragmentation, or alteration of wetland habitat, as described in SEIS Section 3.4, *Wetlands*, may affect amphibians and aquatic reptiles. However, many potential adverse impacts can be controlled through avoidance, minimization, and mitigation measures. These actions may result in long-term, low-intensity, adverse impacts on amphibians and aquatic reptiles.

3.7.1 Affected Environment

3.7.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.7.1, *Affected Environment*, regarding special status species in the Nebraska sandhills and specific occurrences of species in the study area for the proposed action and alternatives, is incorporated by reference into this SEIS with the following differences.

The following species have had status changes since completion of the FEIS.

- The Service published a final rule to remove the interior least tern from the federal list of threatened and endangered wildlife due to recovery on January 13, 2021 (86 FR 2564). While this species is no longer federally listed, it continues to receive protection under the Migratory Bird Treaty Act and the Nebraska Nongame and Endangered Species Conservation Act (NESCA), where it retains its state endangered status.[1]
- The Service changed the listing status of the northern long-eared bat (*Myotis septentrionalis*) from threatened to endangered (87 FR 73488). Similarly, it has been uplisted under NESCA as state endangered.
- The Service changed the listing status of American burying beetle (ABB) (*Nicrophorus americanus*) from endangered to threatened (85 FR 65241). As described in SEIS Section 1.2, *Project Background*, while the Revised HCP acknowledges the updates to prohibited take associated with the 4(d) rule, due to litigation regarding the 4(d) rule that was ongoing during drafting of the Revised HCP, the Revised HCP treats ABB as if typical Section 9 prohibitions were in effect and the final 4(d) rule was not in place (Revised HCP Section 5.1, *American Burying Beetle*). Since that time, the U.S. District Court for the District of Columbia upheld the Service's reclassification and 4(d) rule (see additional information in SEIS Section 1.2). More information on ABB is provided below. Similarly, it is listed under NESCA as state endangered.
- The Service has determined that the monarch butterfly (*Danaus plexippus*) is warranted but precluded from listing (85 FR 81813), making it a candidate for listing. The monarch butterfly was not addressed in the FEIS as a special status species. More information on the monarch butterfly is provided below.
- The Service has proposed to list the tricolored bat (*Perimyotis subflavus*) as endangered (87 FR 56381). It is anticipated that the tricolored bat will be listed as endangered by the state of Nebraska under NESCA), if and when the Service's proposed rule is finalized. The

[1] All federally protected species under the ESA are also protected under the Nebraska NESCA, which is administered by the Nebraska Games and Park Commission (NGPC).

tricolored bat was not addressed in the FEIS as a special status species. More information on the tricolored bat is provided in this section.

- The Nebraska Game and Parks Commission (NGPC) delisted the North American river otter as a state-threatened species in January 2020.

No new species have been designated as state listed that could occur in the study area.

This SEIS addresses species Under Review by the Service in the National Domestic Listing Workplan FY23-27 (FWS 2023a). For American bumble bee (*Bombus pensylvanicus*), regal fritillary (*Speyeria idalia*), variable cuckoo bumble bee (*Bombus variabilis*), golden-winged warbler (*Vermivora chrysoptera*), and little brown bat (*Myotis lucifugus*), the Service determined in its 90-day finding that the petition to list the species under the ESA included substantial scientific or commercial information, indicating that the petitioned actions may be warranted. Therefore, these species are under review with a 12-month finding anticipated in the future. This SEIS also addresses hoary bat (*Lasiurus cinereus*) because the Service is slated to conduct a discretionary status review of the species by fiscal year 2027 (FWS 2023a).

Table 3.7-1 provides a list of state or federally listed special status species potentially occurring within the study area for the proposed action and alternatives.

Table 3.7-1. Special Status Species Potentially Occurring in the Study Area for the Proposed Action and Alternatives

Species	Federal Status [a]	State Status [b]
Insects		
American bumble bee (*Bombus pensylvanicus*)	Under review	None
American burying beetle (*Nicrophorus americanus*)	Threatened	Threatened
Monarch butterfly (*Danaus plexippus*)	Candidate	None
Regal fritillary (*Speyeria idalia*)	Under review	None
Variable Cuckoo bumble bee (*Bombus variabilis*)	Under review	None
Birds		
Bald eagle (*Haliaeetus leucocephalus*)	BGEPA	None
Golden eagle (*Aquila chrysaetos*)	BGEPA	None
Interior least tern (*Sternula antillarum athalassos*)	Delisted	Endangered
Piping plover (*Charadrius melodus*)	Threatened	Threatened
Rufa red knot (*Calidris canutus rufa*)	Threatened	Threatened
Thick-billed longspur (*Rhynchopanes mccownii*)	None	Threatened
Whooping crane (*Grus americana*)	Endangered	Endangered
Mammals		
Hoary bat (*Lasiurus cinereus*)	None	None
Northern long-eared bat (*Myotis septentrionalis*)	Endangered	Endangered
Swift fox (*Vulpes velox*)	None	Endangered
Tricolored bat (*Perimyotis subflavus*)	Proposed Endangered	None
Reptile		
Blanding's turtle (*Emydoidea blandingii*)	Under Review	None

Species	Federal Status [a]	State Status [b]
Fish		
Topeka shiner (*Notropis topeka*)	Endangered	Endangered
Finescale dace (*Chrosomus neogaeus*)	None	Threatened
Northern redbelly dace (*Chrosomus eos*)	None	Threatened
Plants		
Blowout penstemon (*Penstemon haydenii*)	Endangered	Endangered
Small white lady's slipper (*Spiranthes diluvialis*)	None	Threatened
Western prairie fringed orchid (*Platanthera praeclara*)	Threatened	Threatened

[a] Species listed as threatened or endangered under the ESA, candidate or proposed species, species under review by the Service, and species protected under the Bald and Golden Eagle Protection Act (BGEPA).

[b] Species listed as threatened or endangered under the Nebraska Nongame and Endangered Species Conservation Act.

The following sections describe updates to the affected environment for special status species that were addressed in the FEIS, if necessary, and for special status species that were not addressed in the FEIS.

Special Status Insects

American Burying Beetle

The information on ABB in FEIS Section 3.7.11.1, *Affected Environment*, is incorporated by reference into this SEIS, with the following updates.

- When ABB was downlisted to threatened in October 2020 (85 FR 65241), the Service also published a final 4(d) rule describing prohibited, nonprohibited, and exceptions to prohibited take of ABB. Activities that would result in prohibited take from soil disturbance within ABB Northern Plains Analysis Area are still required to seek incidental take authorization from the Service under Section 7 or Section 10 of the ESA (50 CFR 17.47(d)). Soil disturbance is defined under the 4(d) rule as "…movement or alteration of soil. Soil disturbance includes actions such as grading, filling, soil excavating, or topsoil stripping. Soil disturbance also includes non-physical alterations such as chemical treatment" (50 CFR 17.47(d)(3)(v)). The 4(d) rule provides exceptions to prohibited take within the area (i.e., within the Northern Plains Analysis Area), specific to 1) ranching and grazing activities; and 2) wildlife management activities conducted by federal or state wildlife management agencies.
- Revised HCP Section 3.2.1 describes ABB life history traits, habitat characteristics and use, and occurrence in the R-Project study area including ABB presence-absence and mark-recapture surveys (NPPD 2023).

American Bumble Bee

American bumble bee is a generalist bumble bee species that feeds on a wide variety of nectar resources from flowering plants during its active period, generally April to October in Nebraska. American bumble bee colonies nest in grasslands and open farmland, mostly on the surface of the ground among tall grass, but occasionally underground. Queens overwinter, typically buried

1 to 6 inches underground or nestled in plant litter, outside of their natal nest (Powers et al. 2022).

American bumble bee once had among the broadest geographic ranges of any North American bumble bee species, ranging across 47 of the lower 48 United States (Cameron et al. 2011). Recent studies show that the species was not observed across most of its historical northern and eastern range (estimated reduction of 23%) and was abundant only in the south, across the Gulf states and in the western portion of the Midwest (Cameron et al. 2011). American bumble bee is widespread in Nebraska (Xerces 2022). This dramatic range-wide population decline may be due to various threats, including habitat loss, pesticides, disease, climate change, competition with honey bees, and loss of genetic diversity (Cameron et al. 2011).

Monarch Butterfly

On December 17, 2020, the Service issued a 12-month finding (85 FR 81813), determining that the monarch butterfly warranted listing as an endangered or threatened species under the ESA, but that listing was precluded by higher priority listing actions. Monarch butterfly was designated as a candidate species by the Service on May 3, 2022 (87 FR 26152).

Monarch butterfly is a large orange and black butterfly in the brushfoot (*Nymphalidae*) family. In eastern North America, monarchs travel north in the spring, from Mexico to Canada, over two to three successive generations, breeding along the way (FWS 2020). Individual monarchs disperse as far north as they can physiologically tolerate based on climatic conditions and available vegetation; the most specific predictors of the northern distribution of individual monarchs are monthly mean temperature and precipitation (FWS 2020). Monarch butterflies use a wide variety of wildflowers for nectaring, but females exclusively use milkweed as larval host plants (87 FR 26152). Historically, milkweed in agricultural areas was an important source for monarch production. Nonagricultural areas such as roadsides, rights-of-way (ROWs), gardens, old fields, forest openings, riparian areas, wet meadows, prairies, and grasslands may also provide important monarch breeding habitat (Kasten et al. 2016). Milkweeds in nonagricultural areas are becoming increasingly important as agricultural fields are increasingly planted with genetically modified crops that can be sprayed with pesticides, thereby eliminating milkweeds.

In general, monarch butterflies occur throughout Nebraska, showing up in May and migrating through the state in September but breeding occurs throughout the summer. The second, third, and fourth generations reproduce in the northern breeding grounds throughout the summer, inhabiting most of the eastern U.S. up to southern Canada by June or July. The summer breeding range for monarchs includes most of the central and eastern U.S., with the core of the breeding range in the "corn belt" of the midwestern U.S. (Kansas, Nebraska, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana, and Ohio) (USDA 2017). Monarch butterflies can use a wide variety of milkweeds as host plants, and important milkweed species including common milkweed (*Asclepias syriaca*), swamp milkweed (*A. incarnata*), showy milkweed (*A. speciosa*), and whorled milkweed (*A. verticillata*) are found throughout the study area for the proposed action and alternatives (Poicus et al. 2018; Xerces 2019). Nectar resources are particularly important during fall migration (USDA 2017). During fall migration, monarchs make frequent stops to rest and refuel. At these stopovers, they form communal roosts, which are normally in trees (USDA 2017).

Primary threats to the monarch butterfly include habitat loss and degradation from conversion of grasslands to agriculture, widespread use of herbicides, logging/thinning at overwintering sites in Mexico, urban development, drought, exposure to insecticides, and climate change (87 FR 26152).

Regal Fritillary

Regal fritillary is a large, brushfooted butterfly, similar in size to monarch, with distinctive red-orange upperside wings and and dark brown under-hindwings with distinctive, elongate white cells (Selby 2007). Violets (*Viola* spp.) are the sole larval hostplant for the regal fritillary (Selby 2007). Adults feed on a variety of wildflowers. The single flight period is between mid-June to mid-September (Selby 2007).

Historically, the regal fritillary's range covered the northeastern, midwest, and upper plains states, including all of Nebraska. They have been documented in 91 of 93 counties in Nebraska but are generally more abundant in the eastern part of the state (Selby 2007). In Nebraska, regal fritillaries are associated with tallgrass prairie, wet meadows in the sandhills, and subirrigated meadows associated with stream drainages throughout the state (Selby 2007). Threats to the regal fritillary include habitat destruction, prairie fragmentation and degradation, and the loss of larval hostplants. Activities that threaten further habitat loss and fragmentation include row crop agriculture, urban development and housing construction, road construction and maintenance, gravel mining, and wind turbines. Loss of larval host plants may be caused by invasive exotic plant species, herbicides, and encroachment of woody vegetation (Selby 2007).

Variable Cuckoo Bumble Bee

The variable cuckoo bumble bee has a unique life history as a social parasite of the American bumble bee (FWS 2023b). Variable cuckoo bumble bees do not produce workers of their own but, instead, female variable cuckoo bumble bees take over colonies of American bumble bees. This species has never been found to reproduce in the nest of any other bumble bee species; therefore, it relies completely on the success of the American bumble bee (FWS 2023b).

The variable cuckoo bumble bee was historically widespread throughout the eastern temperate forest region of the U.S. Its range spanned the eastern half of the U.S., as far southwest as Arizona and as far northeast as New Hampshire. Occurrence records for variable cuckoo bumble bees are concentrated in the eastern temperate forest and great plains regions of North America, but the species has only been confirmed a handful of times in recent decades (FWS 2023b). The variable cuckoo bumble bee has disappeared entirely from recent records, with the last confirmed observation in Nebraska in 1999, despite increasing survey efforts (Xerces 2022; Koch et al. 2015). Its host (American bumble bee) is found throughout Nebraska, so there is potential for this species to exist in the study area for the proposed action and alternatives.

Threats to this species include the decline in abundance of the American bumble bee, and the stressors described above for American bumble bee (i.e., pesticides, habitat loss or degradation, climate change, and diseases introduced by nonnative bee species).

Special Status Avian and Bat Species

Whooping Crane

The information on the whooping crane in FEIS Section 3.7.7.1, *Affected Environment*, is incorporated by reference in this SEIS, with the following updates.

- The latest estimate of the Aransas-Wood Buffalo population is 536 individuals (FWS 2023c).
- As described in Revised HCP Section 4.1, *Whooping Crane*, NPPD completed daily whooping crane presence/absence surveys during migration periods in fall 2019, spring 2020, fall 2020, spring 2021, and fall 2021, for a total of 699 surveys before R-Project construction or restoration activities. No whooping cranes were observed during these surveys (NPPD 2023).

Tricolored Bat

Tricolored bat is one of the smallest bats in eastern North America (FWS 2021). It is a wide-ranging species that occurs throughout the eastern half of the U.S. and Central America from the Atlantic coast to the western edge of the Great Plains in Wyoming and Colorado, and from Nicaragua to southern Canada (FWS 2021). The primary elements of habitat for tricolored bats include caves, mines, and potentially rock crevices for winter hibernacula; trees for summer and maternity roosts; and forest edges and open water for foraging habitat (Lemen et al. 2016).

During the active season (April 1 to November 1), tricolored bat habitat in Nebraska is primarily associated with forested areas, such as along rivers and breaks, that provide roost trees (White et al. 2016). In the study area, the R-Project ROW lacks large continuous forested habitats but does include forested riparian areas; small, isolated woodlots; and shelterbelts that may provide summer roosting, maternity roosting, and foraging habitat. The species has expanded further west in recent decades, coindicent with an expansion of trees along rivers and increases in suitable winter roosting structures such as mines and human-made structures (FWS 2021). The Service provides the following definition of potentially suitable tricolored bat summer habitat.

> Suitable [tricolored bat; (TCB)] summer habitat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing trees with potential roost substrate (i.e., live and dead leaf clusters of live and recently dead deciduous trees, Spanish moss [*Tillandsia usneoides*], and beard lichen [*Usnea trichodea*]), as well as linear features such as fencerows, riparian forests, and other wooded corridors. TCBs will roost in a variety of tree species, especially oaks (*Quercus* spp.), and often select roosts in tall, large diameter trees, but will roost in smaller diameter trees when potential roost substrate is present (e.g., 4-inch)... TCBs seem to prefer foraging along forested edges of larger forest openings, along edges of riparian areas, and over water and avoid foraging in dense, unbroken forests, and narrow road cuts through forests. TCBs also roost in human-made structures, such as bridges and culverts, and occasionally in barns or the underside of open-sided shelters (e.g., porches, pavilions); therefore, these structures should also be considered potential summer habitat. (FWS 2023d)

Tricolored bat occurs primarily in forested habitats in Nebraska, with most documented occurrences in southeastern Nebraska and scattered observations in central and western Nebraska (White et al. 2016; FWS 2021b). It is generally restricted in the eastern third of Nebraska, as its roosting is associated with deciduous woodlands (Schneider et al. 2018). Data received from the Nebraska Natural Heritage Program and cited in the Revised HCP does not include any record of the tricolored bat occurring in the study area (NPPD 2023). Acoustic monitoring conducted by White et al. (2016) assessed the presence of tricolored bat and it occurred in a limited portion of the study area (i.e., Holt County). The species was not detected, as indicated by a synthesis of their findings and previously published records. The FEIS indicated that documented hibernacula are absent from the study area. This conclusion is further supported by Damm and Geluso (2008) and White et al. (2016).

The study area does not contain large tracts of unfragmented forested habitat, but does include forested riparian areas that could be used as roosting sites. The North American Bat Monitoring Program (NABat) determined mean occupancy probabilities in the modeled species range and found a very low potential within the study area (NABat 2019). The largest contiguous wooded area in the study area is along the North Platte River, crossing near the west end of the study area in Lincoln County, with a wooded area approximately 0.25 mile wide at the crossing. Several smaller woodlots occur in various areas along or near the route. These areas, as well as buildings and bridges in the study area, could provide suitable summer roost and maternity roost habitat. Potentially suitable foraging habitat in the study area includes areas in and near the wooded areas and open water areas associated with rivers and sloughs.

The largest threat to the tricolored bat is white-nose syndrome (WNS) caused by the fungus *Pseudogymnoascus destructans* (FWS 2021; 87 FR 56385). WNS was first detected in Nebraska in 2015 in eastern Nebraska in a mine, became more established in 2016, and spread to additional local hibernacula in 2017 (Bockart 2020; White et al. 2022). WNS has led to documented declines in northern long-eared bats in Nebraska (White et al. 2016; Bockart 2020; White et al. 2022). While Bockart (2020) documented drastic declines in northern long-eared bat populations but not tricolored bat populations, the paper notes that WNS was likely a result of the tricolored bat's extended hibernation period (i.e., most of the tricolored bats had likely already left the study area for their wintering grounds). The declines observed at hibernacula are further supported by White et al. 2016. Inferences made from the WNS surveillance work conducted by Dr. Ian Abernathy (2018, 2019, 2022) suggest the fungus has been detected more recently in Nebraska. In addition to WNS, other threats to the tricolored bat include wind energy–related mortality, climate change, and habitat loss (87 FR 56381).

Hoary Bat

Hoary bat (*Lasiurus cinereus)* is a migratory tree roosting bat species that occurs throughout Nebraska, including in the study area for the proposed action and alternatives (Benedict 2004; Geluso et al. 2004; Geluso et al. 2013). Due to this species' migratory nature, it is not present year-round in Nebraska. The species arrives in Nebraska in May from its wintering grounds in the southern U.S. and remains until approximately October (Geluso et al. 2004). During this time, adult females occur and reproduce statewide, while adult males are known to stay in the Pine Ridge and Wildcat Hills regions of western Nebraska. Hoary bats are a tree roosting bat species, meaning they roost in the leaf canopy of coniferous and deciduous trees. Adults can

roost solitarily, concealed in the canopy of mature trees in dense forests, sparsely wooded areas (i.e., grasslands), or isolated trees or tree clusters that provide shade along urban streets and in city parks. Female hoary bats reproduce in a wide range of similar forested habitats and, unlike other bat species, typically do not form large maternity colonies, often roosting alone or in a small family group consisting of a female and her pups. These forms of summer roosting habitat are present in the study area primarily in the form of riparian forests, shelterbelts, or small, isolated trees or woodlots.

Mortality from collisions with wind turbines is the primary threat to the species, as hoary bats make up the largest proportion of bat fatalities at wind energy facilities in North America (BCI 2023). Wind energy facilities located along the migratory route of hoary bat are a major conservation concern. Although conversion of forested land cover has resulted in loss of habitat for the species, habitat availability is not considered a limiting factor for the species. Hoary bats are less susceptible to contracting WNS because they do not hibernate in close proximity to other bats in caves and mines, where bats typically contract the fungus that causes the disease (Mallinger et al. 2023). Therefore, even with the presence of WNS in Nebraska, WNS is not going to reduce the likelihood of hoary bat occurring or reproducing in the state, including the study area.

Special Status Mammals

Swift Fox

The information described in FEIS Section 3.7.15, *Swift Fox (State-listed Endangered Species)* is incorporated by reference. Habitat for the swift fox consists primarily of shortgrass or mixed-grass prairie, which occurs in western Nebraska (FWS 2018). They are not known to occur in the sandhills (Nevinson 2023), but have been reported in the study area for the proposed action and alternatives in Cherry, Brown, and McPherson counties, and a portion of Lincoln County.

3.7.1.2 Related Renewable Energy Projects

The related renewable energy projects study area partially overlaps with the study area for the proposed action and alternatives and intersects with the Nebraska Sand Hills Ecoregion and special status species considered in the FEIS. The related renewable energy projects study area also includes areas of eastern, central, and western Nebraska not in the study area for the proposed action and alternatives and, therefore, contains special status species not addressed in the FEIS. All species that may occur in the study area for the proposed action and alternatives (Table 3.7-1), except for blowout penstemon, may also occur in the related renewable energy projects study area. Table 3.7-2 provides a list of special status species potentially occurring in the related renewable energy projects study area that do not occur in the study area for the proposed action and alternatives.

Table 3.7-2. Special Status Species Potentially Occurring in the Related Renewable Energy Projects Study Area not Occurring in the Study Area for the Proposed Action and Alternatives

Species	Federal Status [a]	State Status [b]
Birds		
Golden-winged warbler (*Vermivora chrysoptera*)	Under review	None
Mountain plover (*Charadrius montanus*)	None	Threatened
Thick-billed longspur (*Rhynchopanes mccownii*)	None	Threatened
Mammals		
Little brown bat (*Myotis lucifugus*)	None	None
Reptile		
Timber rattlesnake (*Crotalus horridus*)	None	Threatened
Western massasauga (*Sisturus teregemius*)	None	Threatened

[a] Species listed as threatened or endangered under the ESA, candidate or proposed species, and species under review by the Service.

[b] Species listed as threatened or endangered under the Nebraska Nongame and Endangered Species Conservation Act.

The following sections describe species that may occur in the related renewable energy projects study area that do not occur in the study area for the proposed action and alternatives and are therefore not addressed in SEIS Section 3.7.1.1, *Proposed Action and Alternatives* or FEIS Section 3.7.1, *Affected Environment*.

Special Status Avian and Bat Species

Golden-Winged Warbler

Golden-winged warbler (*Vermivora chrysoptera*) breeds in higher elevations of the Appalachian Mountains and northeastern and north-central U.S. (Confer et al. 2020). This species nests in habitat with dense herbaceous cover and patches of shrubs, often adjacent to forest edge (Confer et al. 2020). This species is known as a rare casual migrant in the related renewable projects study area in the spring and an accidental in the fall. This species is an uncommon migrant in eastern counties in the study area (York and Jefferson counties) (Silcock and Jorgensen 2023). This species is declining in many previously occupied areas, correlated with succession and reforestation, as well as hybridization with blue-winged warblers. This species is also known for having high rates of collisions with structures (Confer et al. 2020).

Mountain Plover

Mountain plover (*Charadrius montanus*) is a shorebird in the plover family that inhabits xeric tablelands with sparse, low vegetation. The plover also nests in shortgrass prairie sites with either a history of disturbance by native herbivores or a recent disturbance event (e.g., lightning-strike fire). Recently, many plovers have nested on agricultural fields that are barren when birds arrive on breeding grounds in spring (Knopf and Wunder 2020). The breeding range of this species includes northern New Mexico, eastern Colorado, Wyoming, Montana, and far western Nebraska (Knopf and Wunder 2020). This species primarily winters in the Central, Imperial, and San Joaquin Valleys of California (Knopf and Wunder 2020).

Kimball County (adjacent to Cheyenne County to the west) is the furthest east that this species has been observed nesting in Nebraska (eBird 2023). This species is not known to nest in Cheyenne County (eBird 2023) but has some potential to occur (NGPC 2015). The remainder of the study area is well outside of the known nesting range for this species.

Thick-billed Longspur

Thick-billed Longspur (*Rhynchophanes mccownii*; formerly McCown's Longspur) is a migratory songbird that breeds in shortgrass prairie or structurally similar habitats including overgrazed pasture within the northwestern fringe of the great plains primarily in Wyoming, Montana, and into Alberta and Manitoba (With 2021). The eastern extent of this species breeding range generally corresponds with the extent of shortgrass prairie and ends in western Nebraska. This species may nest in Cheyenne County.

Little Brown Bat

The Service is slated to complete a discretionary status review of the little brown bat by fiscal year 2024 (FWS 2023a). In Nebraska, the species occurs as two subspecies, with *Myotis lucifugus lucifigus* in eastern Nebraska (range similar to the northern long-eared bat) and *M. l. carissima* in far northwestern Nebraska (Benedict 2004; Geluso et al. 2013; White et al. 2016). The related renewable energy projects study area overlaps with the eastern edge of the species' range in Nebraska, particularly with summer roosting habitat. As a species that hibernates in caves and mines, little brown bat is facing rapid population decline from WNS (Kunz and Reichard 2010).

Special Status Reptiles

Timber Rattlesnake

Timber rattlesnake (*Crotalus horridus*) occurs in deciduous and riparian woodlands in conjunction with rock outcrops. This species is widespread in eastern U.S., but in Nebraska, some of the last remaining remaining populations of the massasauga and timber rattlesnakes are found in the sandstone prairie regions of Jefferson and Thayer Counties (Schneider et al. 2011). Even though many of the prairies are degraded, the large size of prairie remnants makes this area unique and provides an opportunity for landscape-scale tallgrass prairie conservation. The largest protected areas in the landscape include Rock Glen Wildlife Management Area (WMA), Rose Creek WMA, and Rock Creek Station State Historical Park. This species may occur in southern or western portions of Jefferson County.

Western Massasauga

Western massasauga (*Sistrurus catenatus*) occurs in wet mesic tallgrass prairie; wet meadows/marsh/prairie; lower-middle tallgrass prairie; and cordgrass wet prairie and is widespread in eastern U.S. In Nebraska, some of the last remaining populations of the massasauga and timber rattlesnakes are found in the sandstone prairie regions of Jefferson and Thayer Counties (Schneider et al. 2011). In the study area, this species may occur in southern or western portions of Jefferson County.

3.7.2 Environmental Consequences

3.7.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on special status species would be the same as presented in FEIS Section 3.7.1.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The following sections describe the effects of the proposed action on each special status species that occurs in the study area for the proposed action and alternatives. Effects on the following species are the same as those described in the FEIS and are incorporated by reference into the SEIS: blowout penstemon (FEIS Section 3.7.12, *Blowout Penstemon [Federally Listed Endnagered Species]),* swift fox (FEIS Section 3.7.15, *Swfit Fox [State-listed Endangered Species])*, and blacknose shiner (FEIS Secton 3.7.16, *Blacknose Shiner [State-listed Endangered Species])*.

Special Status Insect Species

American Burying Beetle

The types and intensity of effects of the proposed action on ABB would be the same as presented in FEIS Section 3.7.11.2, *Direct and Indirect Effects*, except for the following differences.

Direct effects on ABB habitat from construction activities would be expected to permanently remove 19.9 acres of potential ABB habitat and temporarily disturb an additional 1,249 acres of potential ABB habitat (NPPD 2023:125). Emergency repairs during the permit term, which may intermittently affect ABB habitat, are estimated to comprise 351 acres. The Revised HCP estimates a maximum take of 175 beetles (146 from construction and 29 from emergency repairs). Temporary and permanent habitat disturbance from construction activities would represent short- and long-term, moderate-intensity impacts on ABB.

Revised HCP Section 6.2.2, *Mitigation Measures,* summarizes estimated impacts on ABB habitat from covered activities and the mitigation acres required to offset these habitat impacts, which amounts to 509.83 acres (NPPD 2023:139). NPPD has purchased 594 acres of mitigation lands in Blaine County, Nebraska. This parcel is a continuous tract of land that has documented ABB presence along the entire tract (NPPD 2023:140). The Service has approved this parcel as satisfying NPPD's mitigation obligations for take of ABB.

Revised HCP Section 6.3 includes the following updated avoidance and minimization measures (AMMs) for ABB.

- Avoidance of subirrigated wet meadows and mesic grasslands.
- Use of existing roads and two-tracks for access.
- Use of temporary improvements for access.

- Siting temporary work areas in areas unsuitable for ABB use.
- Use of helical pier foundations in the sandhills.
- Helicopter construction.
- Winter construction.
- Conducting limited nighttime construction during periods when ABB are active.
- Using downshielded and low-temperature LED lighting.
- Restoration of ABB habitat.
- Require all personnel, including contractors, to complete a Worker Environmental Awareness Program.

The FEIS proposed action included AMMs that proposed mowing of vegetation and carcass removal to reduce and eliminate ABB use in certain areas as a strategy to avoid take. These AMMs were removed from the Revised HCP because it is unclear if these actions would eliminate all ABB use. Additionally, mowing could result in soil disturbance (e.g., compaction and ground disturbance) that could directly impact ABB through injury or mortality. Carrion removal could affect ABB if they were inside of carrion being removed. Overall, these differences would not change the duration or intensity of effects from what is described for the FEIS proposed action (short and long term; moderate intensity).

American Bumble Bee and Variable Cuckoo Bumble Bee

The proposed action would result in the temporary loss of potential habitat for American bumble bee, including 156.7 acres of agricultural land cover, 1,036.6 acres of dune vegetation, and 149.6 acres of grassland, shrubland, and prairie land cover types (Table 3.5-5). Agricultural land cover includes pasture/hay fields (suitable habitat) and row crops (unsuitable for nesting and poor forage) and is therefore an overestimate of potential habitat. Permanent disturbance of approximtely 27 acres could occur in any of these land cover types and result in long-term habitat loss, but the specific location of permanent disturbance is unknown. Because variable cuckoo bumble bee requires host colonies of American bumble bee, the types, duration, and intensity of effects on variable cuckoo bumble bee would be the same as those described for American bumble bee. The Revised HCP includes updated AMMs for other species, including ABB, which would benefit American bumble bee and variable cuckoo bumble bee.

- Require all personnel to complete a Worker Environmental Awareness Program.
- Avoid subirrigated wet meadows and mesic grasslands.
- Use existing roads and two-tracks for access.
- Use temporary improvements for access.

These AMMs do not eliminate the temporary loss of foraging habitat and potential disturbance or mortality during ROW-clearing activities, nor would they avoid the potential for crushing or grading American bumble bee colonies or overwintering queens. Effects on American bumble bee and variable cuckoo bumble bee would be short and long term and moderate intensity.

Monarch Butterfly

The proposed action would result in the temporary disturbance of potential habitat for monarch butterflies, including 156.7 acres of agricultural land cover, 1,036.6 acres of dune vegetation, and 149.6 acres of grassland, shrubland, and prairie (Table 3.5-5). Permanent disturbance of approximately 27 acres could occur in any of these land cover types, but the specific location of this permanent disturbance is unknown. Because milkweeds are such widespread species potentially occurring in most vegetation types in the study area, the types and intensity of effects on monarch butterfly habitat would be similar to the effects on vegetation described in FEIS Section 3.5, *Vegetation*, and SEIS Section 3.5, *Vegetation*. Wetland habitat would be avoided to the maximum extent practicable, which would benefit monarch breeding on milkweed in wetlands. The removal of habitat containing milkweed during the monarch breeding season could result in direct effects on monarch.

Construction, operation, and maintenance of the proposed action would require vehicular activity, which could result in roadkill. Roadkill is a common source of mortality for monarch butterflies, especially near high-speed roads (e.g., Interstate highways) (FWS 2020b). Slow speeds associated with maintenance vehicles off paved roads would not be expected to result in significant roadkill. Additionally, routine operation and maintenance activities would be scheduled during the ABB inactive season (winter), coinciding with times when monarch butterflies have migrated and are not present.

The Revised HCP includes updated AMMs for other species, including ABB, which would benefit monarch butterflies.

- Require all personnel to complete a Worker Environmental Awareness Program.
- Avoid subirrigated wet meadows and mesic grasslands.
- Use existing roads and two-tracks for access.
- Use temporary improvements for access.
- Schedule routine operation and maintenance activities during the ABB inactive season, which would coincide with when monarch butterflies have migrated out of Nebraska.

Considering these AMMs, effects on monarch butterfly would be short and long term and moderate intensity.

Regal Fritillary

In the study area for the proposed action and alternatives, regal fritillary is primarily associated with wet meadows in the sandhills and subirrigated meadows near stream drainages (USFS 2007). However, without focused surveys for host plants and for the species, regal fritillary cannot be ruled out throughout the study area. The same AMMs that would benefit monarch butterflies would benefit regal fritillary and effects on regal fritillary from the proposed action would be similar to those described for the monarch butterfly (short and long term; low intensity).

Special Status Avian and Bat Species

Bald Eagle

The types and intensity of effects of the proposed action on bald eagle would be the same as presented in FEIS Section 3.7.2.2, *Direct and Indirect Effects*, except for the following differences.

- NPPD conducted bald eagle surveys within a mile of the proposed R-Project centerline at each major river crossed by the proposed centerline in 2014, 2016, 2017, 2018, 2019, and 2020. Revised HCP Table 3-3 presents the 23 bald eagle nests known in the study area for the proposed action and alternatives, including 11 active bald eagle nests identified during NPPD's 2014, 2016, 2017, and 2018 surveys. Of these active nests, one is within 0.5 mile of the proposed R-Project centerline, near Sunfish Lake in northern Garfield County. All other nests identified during these surveys were more than 0.5 mile from the proposed R-Project centerline and associated disturbance areas. Other occupied bald eagle nests identified near the proposed transmission line include one on the North Loup River, 0.56 mile south of the centerline, and one on Birdwood Creek, approximately 1.5 miles downstream of the centerline. A public road that may be used for access is located approximately 0.25 mile from this nest. Per Revised HCP Section 4.3.3, a preconstruction bald eagle nest survey would be completed prior to trees leafing-out in the spring (approximately February to March) and before construction to identify any nests that may have been established since the 2020 survey. If an occupied bald eagle nest is identified during the preconstruction survey, construction activities would comply with seasonal nest restrictions identified in Revised HCP Section 4.4.3, which would avoid potential effects on nesting bald eagles.
- To minimize potential impacts on bird species from collisions with power lines, NPPD would mark all 226 miles of the proposed transmission line and an additional 124 miles of NPPD-owned power lines with bird flight diverters, including marking overhead shield wire at river spans and near wetlands according to APLIC guidelines (2012) and NPPD construction standards (Revised HCP Section 2.4).
- Emergency repairs may temporarily modify an estimated total of 351 acres during the life of the R-Project, which could include upland foraging habitat.
- Revised HCP Section 4.3.3 includes updated AMMs proposed for the bald eagle, which are not anticipated to change the intensity of the effects described in the FEIS.

These differences, including updated AMMs, do not change the effects described for the FEIS proposed action (short and long term, low intensity).

Golden Eagle

The types and intensity of effects of the proposed action on golden eagle would be the same as presented in FEIS Section 3.7.3.2, *Direct and Indirect Effects*, except for the following differences.

- Under the proposed action, 42.1 acres of trees would be removed by ROW clearing for construction. While golden eagles may have historically nested in the study area, they are not known to currently nest within the study area (Silcock and Jorgensen 2023). Tree removal could result in a loss of nesting habitat or degrade foraging habitat by removing

perch sites, but these effects would be of low intensity, given the limited golden eagle activity in the study area.

- To minimize potential impacts on bird species from collisions with power lines, NPPD would mark all 226 miles of the proposed transmission line and an additional 124 miles of NPPD-owned power lines with bird flight diverters. This marking would include overhead shield wire at river spans and near wetlands and in areas of elevated mammal prey densities if observed during construction, according to APLIC guidelines (2012) and NPPD construction standards.
- Revised HCP Section 4.4.3 includes updated AMMs for the golden eagle, which are not anticipated to change the intensity of the effects described in the FEIS.

Given the limited use of the study area by this species, these differences would not change the type or intensity of the effects described for the FEIS proposed action (short and long term, low intensity).

Interior Least Tern

The types and intensity of effects of the proposed action on interior least tern would be the same as presented in FEIS Section 3.7.4.2, *Direct and Indirect Effects*, except for the following differences.

The Revised HCP does not include AMMs specific to interior least tern, but AMMs for other species (e.g., piping plover and rufa red knot) would likely benefit interior least tern because of shared habitat and life history.

- All personnel will be required to complete the Worker Environmental Awareness Program.
- The proposed transmission line will span rivers and streams at locations with existing bridge crossings where such infrastructure is available.
- Wetland habitat will be avoided to the maximum extent practicable.
- Temporary disturbance of wetlands from construction will be restored upon project completion.
- Wetland habitat will be crossed using specialized equipment, temporary matting, or other BMPs.
- Line marking devices will be installed on the overhead shield wire at the North Platte and South Platte river spans.

These differences and updated AMMs would not change the type or intensity of the effects described for the FEIS proposed action (short and long term, low intensity).

Piping Plover

The types and intensity of effects of the proposed action on piping plover would be the same as presented in FEIS Section 3.7.5.2, *Direct and Indirect Effects*. Recent published research confirms the FEIS conclusions. Given that the FEIS documented absence of breeding habitat within the study area for the proposed action and alternatives, piping plovers would migrate through the study area to arrive at breeding/wintering habitats. Telemetry research with the

Atlantic Coast Piping Plover (*Charadrius melodus melodus*) found that offshore migratory flights were conducted at altitudes averaging 9,475 feet (range of model uncertainty: 118–3,383 feet) (Loring et al. 2020), which indicates that migrating piping plovers would be unlikely to be at risk for colliding with the proposed transmission line. The Service is not aware of comparable information specific to the Great Plains population of the piping plover that is present in Nebraska. Because of the low risk for colliding with the proposed transmission line and implementation of AMMs, effects would be the same as described for the FEIS proposed action (short and long term, low intensity).

Rufa Red Knot

The types and intensity of effects of the proposed action on rufa red knot would be the same as presented in FEIS Section 3.7.6.2, *Direct and Indirect Effects*, except for the following differences. Construction of the proposed action could result in the temporary disturbance of 54.8 acres of wetland/riparian land cover types (Table 3.5-6), which would result in temporary disturbance of habitat that may be used by rufa red knot during migration. Revised HCP Section 4.5.3 includes updated AMMs for the rufa red knot. These differences would not change the duration or intensity of effects described for the FEIS proposed action (short and long term, low intensity).

Whooping Crane

The effects of the proposed action on whooping crane would be the same as presented in FEIS Section 3.7.7.2, *Direct and Indirect Effects*, except for the differences described below. These differences do not change the type or intensity of the effects described for the FEIS proposed action.

- NPPD estimates that construction activities associated with the R-Project would result in 28.9 acres of temporary disturbance (up from 12.7 acres in the FEIS) to potentially suitable whooping crane habitat (Revised HCP Table 4-2)(NPPD 2023). The projected 0.013 acre of permanent disturbance has not changed from the FEIS. The Revised HCP also notes that temporary disturbance of 28.9 acres represents 0.3% of potential whooping crane habitat within 1 mile of the proposed R-Project transmission line (NPPD 2023:84). The Revised HCP includes updated information on whooping crane mortalities from the Service's review of confirmed whooping crane sightings and mortalities. See section titled *Service Review of Whooping Crane Sightings and Mortalities* below.
- To minimize potential impacts on whooping cranes, NPPD will mark all 226 miles of the proposed transmission line with bird flight diverters, as described in Revised HCP Section 4.1.3. Portions of the proposed transmission line at river crossings and areas identified as used by birds during low-light conditions will be marked with reflective and glow-in-the-dark surfaces to reduce avian collisions in low-light conditions. NPPD will also mark at least 124 miles of existing line with bird flight diverters, which is equal to the amount of the R-Project line within one mile of potentially suitable stopover habitat.
- During the scoping period for the SEIS, the Service received an unpublished study assessing the effects of the R-Project on the Aransas-Wood Buffalo population (AWBP) of whooping cranes (Barzen et al. 2023). See the below section entitled *Service Evaluation of Barzen et al. 2023* for a review of this unpublished study.

- In 2018, the Service completed a cumulative review and assessment of seven risk analyses, additional supplemental information, rebuttals, as well as peer reviews that evaluated the likelihood of a whooping crane colliding with the proposed transmission line. From this evaluation, the Service developed a comprehensive risk assessment termed the "reasonably certain knowledge" (RCK) analysis (Skorupa 2018). The RCK analysis was updated in 2023 in the Revised HCP's Whooping Crane Risk Analysis Appendix (NPPD 2023) and is henceforth referred to as the RCK analysis or the Service's analysis. The Service supports use of the Skorupa (2018) methodology with updated data, as it represents an appropriate assessment tool and maintains consistency with the approach evaluated by the court in 2020 for evaluating risk of whooping crane mortality resulting from strikes with the proposed transmission line.

Service Review of Whooping Crane Sightings and Mortalities

The Service documents and maintains official records of probable, unconfirmed, and confirmed whooping crane sightings reported by the public as part of a decades long monitoring program. Confirmed sightings are those verified by a qualified biologist or expert, or by photo or video evidence, and are the only sightings the Service supports using in research or decision making. The Service routinely receives erroneous reports of whooping crane sightings that are misidentifications of sandhill cranes (including leucistic), pelicans, snow geese, etc., and as such require confirmation (photo or visually by a trained professional or experienced individual with necessary experience or credentials [i.e., qualified individual]).

Additionally, the Service maintains the original source information for whooping crane mortality records, including a select number of power line mortality records reported as part of the whooping crane public sightings tracking database (i.e., the record that was first submitted, evaluated, and recorded by the Service). The Service does not support the use of whooping crane sightings or mortalities in analyses unless they meet the definition of a confirmed sighting.

Since the Skorupa (2018) analysis, the Service conducted a review of all existing mortality data and identified a discrepancy in two publications of historic whooping crane mortality (Stehn and Wassinich 2008; Stehn and Haralson-Strobel 2016). Because these data were used in Skorupa (2018) and the discrepancy was related to mortality dates and types of power lines (transmission vs. distribution), the Service subsequently reviewed the accuracy of source data reported in those publications.

Specifically, the record for the October 1988 Nebraska power line mortality reported in Stehn and Wassenich (2008) and Stehn and Harralson-Strobel (2016) was found on file as a hard copy record. However, this record was not included in the GIS database of confirmed sightings. The Service determined that this was because the original record for this observation did not meet the scientific standard of a confirmed sighting, which supports its absence in the database of confirmed sightings. Therefore, the statement in Stehn and Wassenich (2008) that "historically, at least nine whooping cranes in the Aransas-Wood Buffalo population (AWBP) died from collisions with power lines during 1956–2006" is inaccurate because one of these sightings/mortalities was not confirmed. Inclusion of this record as a confirmed whooping crane mortality is inconsistent with the official observational record, and for these reasons, this

record was removed from the RCK analysis, and the Revised HCP and this Draft SEIS reflect our updated analysis.

The Service is working with several whooping crane experts to update all mortality records as part of the North American Crane Working Group Workshop conducted in 2023. Publication of proceedings from that workshop are anticipated in 2024. The publication will include all mortality to date of fledged AWBP whooping cranes throughout their range.

Service Evaluation of Barzen et al. (2023)

The Barzen et al. (2023) model utilized different data and methods, from previous analyses, and other aspects from similar analyses. The Service has described the primary differences in the following categories in the below subsections: 1) whooping crane observation buffer distance, 2) use of sandhill crane data as surrogate, 3) use of different population growth models, and 4) consideration of minimization measures.

Whooping Crane Observation Buffer Distance

In Barzen et al. (2023), the authors defined the study area by creating a buffer comprised of 25 km on both sides of the proposed R-Project transmission line (total 50 km buffer) from which whooping crane observations within this buffer were considered nonmigratory movements (e.g., stopover sites). The Service did not find a literature reference for this buffer distance, or justification that would support use of this buffer. This adoption of a larger buffer appears to overestimate the probability of a power line strike by increasing the number of whooping cranes that could be at risk for colliding with the proposed transmission line.

Nonmigratory flight data for whooping cranes has varied over time. Recent publications relying on telemetry data have provided additional insight on nonmigratory whooping crane flight distances. Pearse et al. (2017) identified unique roost sites during migration as two independent use sites separated by 15 km or greater. Additional telemetry data and a new analysis was conducted by Pearse et al. (2020), which identified unique stopovers as anything over 10 km from a previous stopover. Unique stopovers represent areas for which subsequent movements within that buffer are considered nonmigratory. In 2021, Pearse et al. (2021) identified that 95% of movements within stopover sites were <5 km, providing the most applicable and recent estimate for appropriate buffers relating to nonmigratory diurnal use sites and distances traveled.

Barzen et al. (2023) stated that whooping cranes did not reach elevations equal to transmission line heights until they were 0.25–1.5 km away and offered no further explanation for the 25 km buffer. The majority (95%) of diurnal flight distances are less than 5 km once arriving at the roost (Pearse et al. 2021). Barzen et al. (2023) applied an overestimated diurnal flight distance, which overestimates the frequency at which whooping crane would be flying at the same altitude of transmission lines; and this overestimation increases the collision risk estimate.

Use of Sandhill Crane Data as Surrogate

The lack of consistent and accurate data related to power line mortalities of whooping cranes appears to be a contributing factor in the Barzen et al. (2023) report, which relied upon sandhill crane collision data in their risk assessment as a surrogate for whooping cranes. The Service

finds the application of surrogates unnecessary, as whooping crane data is available for use in these risk assessments.

Barzen et al. (2023) used sandhill crane power line collision rates as a surrogate for whooping cranes and justified their collision and mortality data by comparing them to experimental populations of whooping cranes that experienced similar collision rates. Skorupa (2018) discussed the use of experimental populations of whooping cranes as well as sandhill crane collision data as a proxy for AWBP whooping crane data and explained the rationale for using AWBP whooping crane data instead of alternative data as a surrogate. Confirmed mortality data indicates that experimental populations of whooping cranes have experienced higher mortality from power line collisions and other sources due to different behavioral, demographic, and geographic factors influencing mortality, and comparisons of mortality using different populations or different species may not always be appropriate. Power line collisions are a well-known threat to whooping cranes and a known source of mortality, though estimates of the extent to which collision mortality represents the proportion of total mortality, or the proportion of mortality during migration, have varied significantly.

Recent telemetry data using advanced cellular telemetry units affixed to whooping cranes may help refine this relationship in the future. During the period of 2016–2023, at least 104 whooping cranes have been tracked with cellular telemetry units providing data every 10 minutes. While future analysis of the data is needed (such analysis is not currently publicly available), two whooping cranes, or approximately 2% of cranes monitored, are known to have died from collision with power lines (one migration, one winter) over the eight-year period to date. Only a subset of the 104 whooping cranes was tracked initially, with additional cranes added annually, and while many causes of death are unable to be determined, there was no circumstantial evidence indicating power lines were a contributing factor in other mortality events. The Service anticipates that this dataset will allow the refinement of annual whooping crane mortality rates using direct mortality information (and proportion of total mortality) and will help answer questions related to the likelihood of power line collisions for the AWBP during their annual lifecycle (migration, winter, summer).

The Service continues to rely on known whooping crane mortalities as the key source of data in the RCK analysis, and this remains the preferred approach instead of using surrogate data.

Use of Different Population Growth Models

Whooping crane risk sensitivity analyses, described in Skorupa (2018), described the various population growth models and estimates applied previously. Population growth models and estimates described in Barzen et al. (2023) deviated from previous whooping crane risk sensitivity analyses. The publicly available population viability analysis for the AWBP proposes a population growth model and growth estimate that was subsequently adopted by the Service for use in its Draft Species Status Assessment in 2020 (FWS 2020). The population viability analysis projected an AWBP population of 2,783 individuals in 50 years from the time that analysis was completed. For reference, Skorupa (2018) estimated 3,014 individuals in 50 years. Barzen et al. (2023) estimated 4,973 individuals in 50 years, which increases the estimate of a whooping crane power line mortality over 50 years. The authors provide no explanation as to

why their methods to predict AWBP population growth are better than those used by Skorupa (2018) or the Service's population viability analysis.

Consideration of Minimization Measures

The Service's risk analysis also incorporated minimization measures as part of the proposed action, including line marking with bird flight diverters, as described at the beginning of this subsection. Bird flight diverters (BFD) have a 50% to 80% effectiveness (Yee 2008; Brown & Drewien 1995; Morkill & Anderson 1991) in reducing power line collisions across avian species and were assumed in Skorupa (2018) to result in a 50% reduction in power line collisions (based on a reasonable estimate of the range of effectiveness for crane species). Barzen et al. (2023) did not consider bird flight diverters as a component of the proposed action and, therefore, they overestimate collision risk.

Effects Summary

Based on the above review, the types and intensity of effects of the proposed action on whooping crane would be the same as presented in FEIS Section 3.7.7.2, *Direct and Indirect Effects*. The Service's review of the various methods and best available science continues to conclude that the risk of whooping crane collision is low (less than 0.5 whooping cranes over the 50-year life of the proposed action). NPPD concludes in the Revised HCP that the likelihood of whooping crane collisions with the proposed transmission line is extremely low (NPPD 2023). The Service concludes that there is no scientifically reliable evidence that take of whooping cranes from collision with the proposed transmission line is reasonably certain to occur, and that effects from the proposed transmission line would be long term and low intensity.

Northern Long-eared Bat

The types and intensity of effects of the proposed action on northern long-eared bat would be the same as presented in FEIS Section 3.7.8.2, *Direct and Indirect Effects*, except for the following differences.

The permanent removal of approximately 42.1 acres of scattered wooded habitat and additional tree trimming and removal to keep the ROW clear of trees would result in the loss of potential summer roosting habitat for northern long-eared bat. The removal of potential summer roosting habitat would cause northern long-eared bats that may be present to cover greater distances when flying to and from roosts or hibernacula, resulting in increased energy expenditure during flight. Emergency repairs may temporarily disturb an estimated total of 351 acres of habitat and affect the species' flight expenditures; however, the timing and location of emergency repair activities cannot be predicted.

Revised HCP Section 4.6.3 includes updated AMMs for the northern long-eared bat. Updated AMMs for ABB (Revised HCP Section 6.3) would protect other species as well, including northern long-eared bat. These differences in the proposed action, including updated AMMs, would not change the effects described for the FEIS proposed action (short and long term, low intensity).

Tricolored Bat

The permanent removal of approximately 42.1 acres of scattered wooded habitat and additional tree trimming and removal to keep the ROW clear of trees and shrubs would result in the loss and disturbance of potential summer roosting habitat for tricolored bat. Trees to be removed may provide summer roost, maternity roost, and foraging habitat for tricolored bats. The study area for the proposed action and alternatives does not contain any documented occurrences of tricolored bats to date. No caves or mines that may serve as hibernacula occur in the counties intersected by the study area. The Revised HCP includes AMMs for tricolored bat requiring NPPD to avoid tree clearing within the proposed transmission line ROW in potential tricolored bat habitat during the active season (April 1 to November 1) to eliminate the potential for impacts on undocumented maternity roost trees (Revised HCP Section 4.7.3).

The Service's proposed listing decision stated that the current impacts of habitat loss to tricolored bat are low because the severity of population-level declines from habitat loss is slight. Similar to northern long-eared bat, the removal of potential summer roosting habitat can cause tricolored bats that may be present to cover greater distances when flying to and from roosts or hibernacula, resulting in increased energy expenditure during flight. Given the limited extent of suitable habitat in the ROW, tricolored bat use is expected to be low. The avoidance of tree clearing activites associated with project construction during the tricolored bat active season (Revised HCP Section 4.7.3), ensures that the project would not have a direct effect on potenital night roosting or maternity roosting tricolored bats. For these reasons, management of trees in the ROW during operation and emergency repairs would also be unlikely to affect the the tricolored bat. Trees cleared from the ROW would not be allowed to regrow to a height or diameter that would provide suitable habitat for the species in the future. Any removal of dangerous trees that encroach on the ROW would be completed outside the ABB active season (Revised HCP Section 4.7.3), which would coincide with the tricolored bat hibernation period. Such tree removal has a low likelihood of affecting the tricolored bat through increased energy expenditures.

Given the limited potential for effects on tricolored bat habitat and the AMMs, effects would be short and long term and low intensity.

Hoary Bat

The permanent removal of approximately 42.1 acres of scattered wooded habitat in the ROW would be required to construct the proposed transmission line. Tree trimming and removal would be necessary to keep the ROW clear of trees and shrubs. This wooded habitat is considered suitable summer roosting habitat for hoary bat day/night roosting and potentially maternity roosting behaviors.

The Revised HCP does not include AMMs specific to hoary hat, but the AMMs established for other bat species (i.e., northern long-eared bat and tricolored bat) would benefit hoary bat because of the species' similar habitat preferences and life histories. NPPD would avoid tree clearing within the proposed transmission line ROW in potential tricolored bat and northern long-eared bat during the active season (April 1 to November 1) which would also avoid impacting roosting life stages of hoary bat. Fragmentation of available wooded habitat would occur. Given the limited extent of suitable habitat available in the study area and NPPD's

commitment to avoidance of tree clearing during the active season for northern long-eared and tricolored bat (see Revised HCP Sections 4.6.3 and 4.7.3) it is unlikely that project construction would affect the hoary bat.

As previously mentioned, wooded habitat removed during construction would be permanent, as it would not be allowed to regrow during project operation and maintenance to a height or diameter that would be suitable for roosting hoary bats. Removal of hazardous trees that encroach on the ROW would be completed outside the ABB active season, which coincides with the hoary bat's southern migration out of Nebraska. Such tree removal would not affect the hoary bat.

Given the limited potential for effects on hoary bat habitat and implementation of AMMs, effects would be short and long term and of low intensity.

Special Status Reptiles

Blanding's Turtle

The types and intensity of effects of the proposed action on Blanding's turtle would be the same as presented in FEIS Section 3.7.9.2, *Direct and Indirect Effects*, except for the following differences. Construction activities are expected to temporarily disturb approximately 149.6 acres of upland grassland and prairie habitat and 54.8 acres of wetland/riparian habitat for access to structures during construction. NPPD would avoid wetland habitat to the maximum extent practicable. As described in SEIS Section 3.4, *Wetlands*, there would be no permanent disturbance to wetlands resulting from construction of the proposed action. Revised HCP Section 4.8.3 includes updated AMMs for the Blanding's turtle, which are not anticipated to change the effects described for the FEIS proposed action (short and long term, low intensity).

Special Status Fish

Topeka Shiner

FEIS Section 3.7.10.2, *Direct and Indirect Effects*, determined that the project would have no effects on Topeka shiner because, while suitable habitat for the species occurs in the study area, this habitat would not be affected by the proposed action. Per the Revised HCP, emergency repairs may temporarily disturb an estimated 351 acres during the life of the R-Project, the timing and location of which cannot be predicted. Therefore, it is assumed that suitable habitat for Topeka shiner could be affected by emergency repair activities. Specifically, temporary bridges crossing suitable Topeka shiner habitat could be required for emergency repair vehicles but would be removed following completion of the repair. The Revised HCP includes AMMs that prohibit in-water work in small streams providing potentially suitable habitat, to avoid crossings of streams and otherwise protect suitable habitat. Effects on Topeka shiner would be greater than described in the FEIS and would be short term and low intensity, should the species occupy streams in the study area in the future.

Finescale Dace and Nothern Redbelly Dace

The types and intensity of effects of the proposed action on finescale dace and northern redbelly dace would be the same as presented in FEIS Sections 3.7.17.2 and 3.7.18.2, *Direct and*

Indirect Effects, except for the following differences. Construction activities are expected to temporarily disturb approximately 0.3 acre of open water habitat, which could be suitable habitat for finescale dace and northern redbelly dace. Emergency repairs may temporarily disturb an estimated 351 acres during the life of the R-Project, the timing and location of which cannot be predicted (NPPD 2023; Table 4-1). It is assumed that these activities could affect dace habitat. Revised HCP Section 4.9.3 includes updated AMMs for the Topeka shiner, which would also protect finescale dace and northern redbelly dace because of similarity in range and habitat requirements. These differences, including updated AMMs, do not change the effects described for the FEIS proposed action (short term, low intensity).

Special Status Plants

Western Prairie Fringed Orchid and Small White Lady's Slipper Orchid

The types and intensity of effects of the proposed action on western prairie fringed orchid and small white lady's slipper orchid would be the same as presented in FEIS Section 3.7.13.2 and FEIS Section 3.7.19.2, *Direct and Indirect Effects*, except for the following differences. Per Revised HCP Section 4.11, *Western Prairie Fringed Orchid*, construction activities may result in disturbance of 320 acres of field-verified suitable western prairie fringed orchid habitat. This same habitat is suitable for small white lady's slipper orchid. Revised HCP Section 4.11.3 includes updated AMMs for the western prairie fringed orchid, which would also protect small white lady's slipper orchid. These differences, including updated AMMs, are not anticipated to change the effects described for the FEIS proposed action (short and long term; low intensity).

Alternative A (FEIS Proposed Action)

The types and intensity of effects of Alternative A on special status species would be the same as presented in FEIS Section 3.7 and are incorporated into this SEIS by reference.

The types and intensity of effects of Alternative A on American bumblebee, monarch butterfly, regal fritillary, variable cuckoo bumble bee, and hoary bat would be similar to those under the proposed action, with the following differences. Alternative A includes approximately 49 acres of tree removal in the ROW, which is slightly more than the 42.1 acres estimated under the proposed action. NPPD estimates less temporary disturbance under Alternative A than the proposed action (Table 3.1-2). Overall, these changes do not change the types or intensity of effects on these species compared to the proposed action.

Alternative B (Steel Monopole Only)

The types and intensity of effects of Alternative B on special status species would be the same as presented in FEIS Section 3.7 and are incorporated into this SEIS by reference, with the following differences. The increased estimated area of temporary and permanent ground disturbance (Table 3.1-2) would result in greater effects from habitat loss than the proposed action. Effects from operation and maintenance activities and AMMs for all species would be the same as the proposed action. Although effects under Alternative B would be greater than the proposed action, overall duration and intensity of effects on species analyzed in the FEIS would

be the same as described for Alternative B in the FEIS, except for Topeka shiner, for which effects would be of low intensity.

The types and intensity of effects of Alternative B on American bumblebee, monarch butterfly, regal fritillary, variable cuckoo bumble bee, and hoary bat would the same as under the proposed action.

3.7.2.2 Related Renewable Energy Projects

Impacts on special status species from construction and operation of the related wind and solar energy projects could include injury or mortality to sensitive species; habitat loss or fragmentation; permanent and temporary displacement of sensitive species or interference with feeding, mating, nesting, or migratory behaviors of sensitive wildlife species; and habitat alteration or degradation associated with the introduction of invasive species.

Special Status Insects

The related renewable energy projects may cause direct injury or mortality to individuals or habitat loss, fragmentation, or alteration in the related renewable energy projects study area. The degree of impacts on these species would be correlated to the amount and quality of habitat affected by project construction, as avoidance of grassland and prairie habitat would prevent impacts. Cropland, which is generally unsuitable habitat for special status insect species, comprises much of the study area (Table 3.5-3). Development of the related renewable energy projects on already disturbed agricultural land would avoid impacts on grassland and prairie habitat. However, the proposed Prairie Hills Wind project area is made up of over 75% grassland and prairie habitat (Table 3.5-4), indicating a higher potential for impacts on special status insect species from this project. The magnitude of effects would depend on the siting of related renewable energy projects and what land cover types are affected but would generally be of low to moderate intensity.

In the related renewable energy projects study area, ABBs could occur within Antelope, Holt, Greeley, and Wheeler counties. ABBs are highly sensitive to disturbance and largely restricted to areas mostly undisturbed by human activity (FEIS Section 3.7.11), making them vulnerable to habitat fragmentation and alteration, disturbance, and individual mortality. Specific to the Thunderhead Wind Energy Center (Thunderhead), the Service determined that operation of the project would have no effect on ABB because the project is not in suitable habitat and includes environmental commitments (e.g., carrion removal and vegetation management) which would reduce the likelihood of ABB occupying habitat in the future (WAPA 2022). Considering potential effects on ABB, it is not certain that adverse effects on ABB could be avoided; however, project developers would be required to comply with ESA Section 9. Development of the related renewable energy projects may result in long-term, moderate-intensity effects on ABB, depending on their specific location.

Special Status Avian and Bat Species

Construction of power lines, wind turbines, and other utility infrastructure could affect special status birds and bats through collisions with these structures. The types of effects of these

activities on special status avian and bat species would be similar to the potential effects on other avian and bat species, as described in SEIS Section 3.6, *Wildlife*.

Special Status Bats

The Service identifies wind energy mortality as a factor affecting northern long-eared bat, little brown bat, and tricolored bat viability, although to a much lesser extent than the influence of WNS. The Service identifies wind energy mortality as a major concern for hoary bat. All of these species could be affected by related wind energy projects and therefore, related renewable wind energy projects in the range of these species would likely need to employ AMMs to limit effects. Specific to Thunderhead, WAPA (2022) found that adverse effects on the species from project operation were extremely unlikely because of low species occurrence in the project area and adopted AMMs.

Impacts on northern long-eared bat, tricolored bat, hoary bat, and little brown bat from the construction of the related renewable energy projects may result from tree clearing activities, including from noise generated by construction equipment. These effects would be long term and low intensity because they would modify suitable summer roosting habitat for bats during hibernation. This permanent removal of suitable summer roosting habitat across the landscape could impact the species' flight expenditure to roost trees and hibernacula, or potential undocumented maternity roost sites.

Operation and maintenance of projects in the related renewable energy projects may result in long-term, low- to moderate-intensity, adverse impacts on special status bat species, including mortality resulting from collision with wind turbine blades. The intensity of impacts would depend on project siting and the application of project-specific AMMs (e.g., BMPs and mitigation measures adopted by the project developers, such as those in the Service's Land-Based Wind Energy Guidelines [FWS 2012b]).

Special Status Birds

Special status bird species may be affected by habitat loss, fragmentation, or alteration from the related renewable energy projects, similar to general avian species (SEIS Section 3.6). Details on potential effects on bald eagle and whooping crane are described below.

Bald Eagle

FEIS Section 4.4.4, *Special Status Species*, describes the potential impacts on bald eagles from collisions with wind turbines. The Service has observed an increase in bald eagle mortality caused by wind turbine collision in Nebraska, typically on overcast or cloudy days and particularly in Antelope County, likely due to the increasing population of the bald eagle and more birds flying in areas at risk of turbine strikes. In consideration of these trends, effects from the related wind energy projects would be long term and of moderate intensity.

Whooping Crane

The related renewable energy projects could result in effects on whooping crane, including lethal effects (e.g., from direct collision with a wind turbine or other associated infrastructure) and sublethal effects (e.g., from indirect impacts of other stressors, primarily habitat loss from

increased energy infrastructure development). The Service identified six related renewable energy wind projects, five of which would be within the 95% primary whooping crane migration corridor (Figure 3.7-1). Additionally, two related solar projects were identified, one of which is within the 95% whooping crane migration corridor. The Service is unaware of specific effects on whooping crane from solar projects, beyond the summary of effects described for general avian species in SEIS Section 3.6.

As described in SEIS Section 3.6, construction of power lines and other utility infrastructure could affect birds, including whooping cranes, through collisions with these structures. The exact location and lengths of power lines and utility infrastructure associated with the related renewable energy projects are currently unknown and therefore effects on whooping crane from these cannot be further described. The one exception is the already-constructed Thunderhead and associated infrastructure. Specific to Thunderhead, incidental take of whooping crane is unlikely, in part due to adopted AMMs to minimize the potential for collision with wind turbines (FWS 2022).

To date, no whooping crane mortality has been documented at wind energy facilities. Two sandhill crane collision deaths were documented at a wind energy facility in Texas (Stehn and Strobel 2011). The sandhill crane is often regarded as a surrogate species for the whooping crane; however, sandhill cranes are far more numerous than whooping cranes, making collision mortality of this species more probable. Still, the possibility of whooping crane mortality from collision with wind turbines remains.

One study found that whooping crane use within 5 kilometers (3.1 miles) of wind energy infrastructure was significantly less than expected, suggesting possible avoidance of habitat near wind farms within that distance (Pearse et al. 2021). However, using this study to determine the effects of the related renewable energy projects to whooping crane energy expenditures and potential loss of fitness to the AWBP is challenging. Pearse et al. 2012 provides a framework to conduct a sensitivity analysis by applying their energetic model developed for a few hypothetical scenarios in which a whooping crane would deviate from its migration path (e.g., due to a wind energy project) for distances between 10 km up to 200 km over its entire migration. It is important to note that Pearse et al. (2021) does not explicitly indicate whether whooping cranes fly around wind farms, only that they appear to avoid using habitat near them. To be conservative, one could assume AWBP individuals would deviate from their migration route. In corn-dominated landscapes, such as those that would be encountered throughout the Nebraska migration corridor, a whooping crane could travel an additional 100 km (representing 2.5% of the 4,000-km migration) and replenish those fat reserves with one additional day of foraging in a corn-dominated landscape.

Applying this to the five related wind energy projects within the 95% whooping crane migration corridor, it is anticipated that, at most, an individual whooping crane would cross four of them on any migration path (given the east-west distribution of the wind farms and known biology of whooping crane migration being north-south). Applying the 5-km avoidance distance plus consideration of the typical wind farm size, a simple sensitivity analysis suggests these projects independently would, at most, require one additional day of foraging (conservative estimate of 40 km of additional flight), thereby increasing the length of time in migration by up to one day, regardless of habitat type. Whooping cranes have demonstrated

resilience and adaptability during migration as a strategy to overcome environmental change (Pearse et al. 2018). Recent telemetry data indicating variable beginning and end dates, length of stopovers, and overall length of migration suggest they are adapted to minor year-to-year variation based on weather, climate, wind, habitat and preexisting physiological conditions.

The Service recognizes that habitat modification associated with the related renewable energy projects may have the potential to result in adverse effects rising to the level of take (injury or death) from habitat loss from wind farms across the entire migration corridor. Specific to the related wind energy projects, the Service would anticipate only a small percent of the whooping crane populations' migration path would cause them to consider deviating around the related wind energy projects, as the migration corridor for the population is approximately 300 km wide.

Under the ESA, harm is defined as an act which kills or injures wildlife, and which may include significant habitat modification or degradation. For harm to occur, habitat modification would have to significantly impair essential breeding, feeding, or sheltering. Given the plasticity and range of whooping crane migration chronology, the Service would not anticipate that a limited number of whooping cranes requiring one additional day of migration would result in killing or injuring individuals or significantly impairing essential feeding, breeding, or sheltering.

Therefore, although related renewable energy projects may result in long-term, low-intensity, adverse impacts on whooping crane, the Service concludes that there is no scientifically reliable evidence that take of whooping cranes from related renewable energy projects is reasonably certain to occur. Therefore, effects on the whooping crane from related renewable energy projects would be long term and of low intensity.

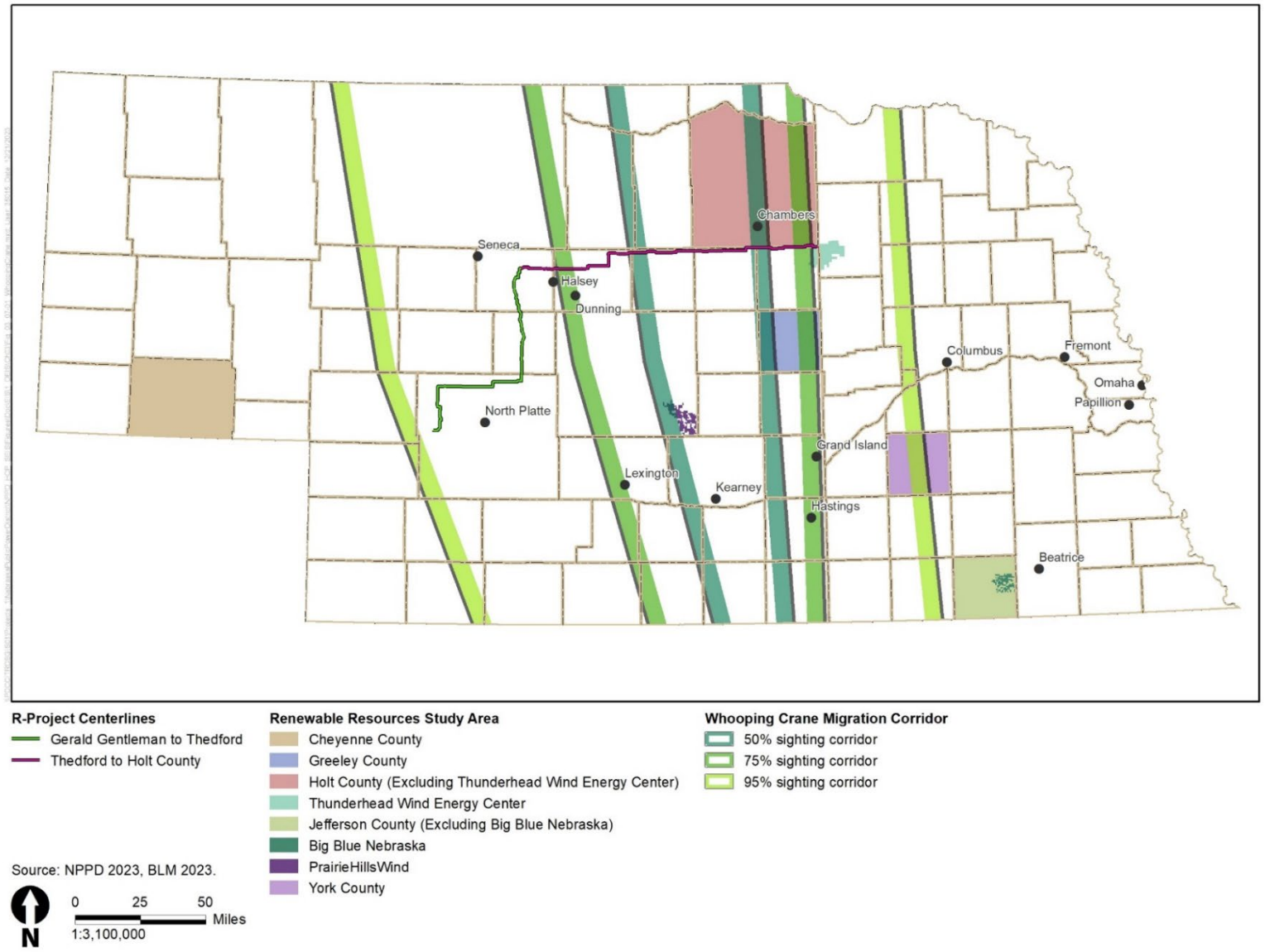


Figure 3.7-1. Related Renewable Energy Projects in the Whooping Crane Migration Corridor

Special Status Canine

Related renewable energy project actions in Cheyenne County that cause the loss, fragmentation, or alteration of prairie habitat may have long-term, low-intensity adverse effects on the swift fox.

Special Status Reptiles

Related renewable energy project actions that cause loss, fragmentation, or alteration of sandstone prairie may adversely affect special status reptile species, including timber rattlesnake and western massasauga. Such effects would be short and long term and low intensity.

Related renewable energy project actions that result in loss, fragmentation, or alteration of wetland habitat, as described in SEIS Section 3.4, may adversely affect Blanding's turtle. However, many potential adverse impacts can be controlled through AMMs. These effects would be short and long term and low intensity.

Special Status Fish

Related renewable energy project actions that adversely affect water resources (e.g., degradation of water quality) may adversely affect special status fish species, including finescale dace and northern redbelly dace. These effects would be long term and low intensity.

Special Status Plants

The related renewable energy projects could have similar effects on special status plants, including western prairie fringed orchid and small white lady's orchid, as described for wetlands and vegetation (SEIS Sections 3.4 and 3.5). The small population sizes of these species make them vulnerable to habitat fragmentation and alteration, disturbance, and individual mortality. Impacts on these species would depend in part on the details of related renewable energy project development and the location of the projects relative to species populations and suitable habitat. The concurrence of these species' habitat with wetlands that would likely be avoided by the related renewable energy projects reduces the likelihood of impacts on these species. Should project development require other federal permitting (e.g., Clean Water Act permitting), potential impacts on these species would be addressed through ESA Section 7 consultation. Should consultation through Section 7 be necessary, it is likely that impacts on special status plant species would be eliminated or reduced through AMMs, such as preconstruction surveys. Overall, impacts on special status plant species would be short term and low intensity, especially if AMMs are followed.

Section 3.8
Land Use

3.8.1 Affected Environment

3.8.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.8.1, *Affected Environment*, land use and land ownership in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

There is a new conservation easement in the study area on the Horseshoe Bar Ranch in Thomas County, planned under the Natural Resources Conservation Service Agricultural Conservation Easement Program and owned by the Nebraska Land Trust. Like much of the study area, this conservation easement is presently used for haying and grazing. As this easement was not in place during preparation of the FEIS, it was not considered in the FEIS.

3.8.1.2 Related Renewable Energy Projects

The related renewable energy projects study area for land use includes the eight counties that contain related renewable energy projects (Figure 3.1-1). These counties are generally characterized by a rural landscape of rolling, dissected hills; tributaries to larger creeks; terraces; and stabilized sand dunes. Land cover types in the study area for related renewable energy projects include ranchland, rolling prairies, grassland, farmland, loess hills, the Great Plains, and the Sandhills, a stabilized sand dune complex.

Approximately 95% of the Sandhills area is maintained as native grasslands, primarily for beef production (cattle ranching); most, if not all, of the area maintained as native grasslands is on privately held land. Grasses, available water, and range conservation combine to make this area one of the world's premier cow and calf production regions (Hayford and Baker 2011). Many formerly cropped lands in this region have been reseeded to grass and placed into the Conservation Reserve Program (CRP). Conversely, up to 95% of the grasslands in the Great Plains has been converted for agriculture (Otto et al. 2022).

Land Ownership, Jurisdiction, and Regulatory Framework

More than 95% of the land in the study area for related renewable energy projects is privately owned and under local jurisdiction; the rest is under state or federal jurisdiction (Table 3.8-1). Land jurisdiction refers to the geographic area within which a landowner or land manager has authority to make decisions regarding land uses. However, note that jurisdiction does not necessarily reflect ownership. For example, easements, leases, and other land use agreements grant usage rights without transferring ownership.

Table 3.8-1. Land Ownership and Jurisdiction in the Related Renewable Energy Projects Study Area

Ownership/Jurisdiction Type	Acres	Percent of Study Area
Federal	1,047.1	<0.1
State	123,853.0	3.5
Private/Local	3,381,553.1	96.2
Undetermined	7,949.2	0.2

Source: Nebraska Department of Revenue 2021

The following subsections describe the federal, state, and local government land use resources in the study area and identify applicable regulations, plans, and standards.

Federal Jurisdictions

The approximately 1,000 acres in the study area under federal ownership are owned by BLM and the Service.

State Jurisdiction

NGPC manages several conservation areas in the study area, including three State Recreation Areas (SRAs), 18 Wildlife Management Areas (WMAs), Rock Creek Station State Historical Park (SHP), and Swan Lake Fish Hatchery. NGPC's Wildlife Division manages WMAs, while the Parks Division manages SHPs and SRAs primarily for active outdoor recreation pursuits, day-use activities, and camping (NGPC 2023). For more information about recreation in the study area, see SEIS Section 3.9, *Recreation and Tourism*.

State regulations pertinent to the development of renewable energy, particularly wind resources, can be found in the Nebraska Revised Statutes, specifically Chapters 66-901, 66-902, 66-909, and 66-911 to 66-914. These statutes provide a framework for establishing easements on adjacent properties, serving to prevent future developments that may obstruct or limit access to wind resources. They are formalized through recordation on property deeds and can be enforced through injunctions, equity proceedings, or other civil actions. These easements can be established for wind energy facilities of any capacity, underlining the state's commitment to promoting renewable energy (Nebraska Legislature 2023).

Private Ownership and Local Government Jurisdiction

The study area includes private land that local governments regulate via comprehensive plan policies and zoning regulations. The study area includes lands within the planning jurisdiction of eight counties and the cities, villages, and unincorporated communities of each of the eight counties in the study area.

Nebraska counties have a planning jurisdiction that includes any rural area in the county boundary but outside the planning jurisdiction of any village or city. If a village or city chooses not to claim an extraterritorial planning jurisdiction, a county may extend its planning jurisdiction up to the corporate limits of the village or city. Nebraska state statutes govern the adoption and preparation of local community comprehensive plans, which provide goals, policies, and action strategies in the areas of land use, public facilities and utilities, transportation, and housing, as well as recommendations for plan implementation and plan

maintenance. These state statutes establish rules that govern how land is developed in a local municipality and its extraterritorial jurisdiction.

A comprehensive plan is a long-range plan that focuses on the factors and functions that affect the physical growth and development of a community or region. The comprehensive plan is sometimes referred to as the long-range community plan or the master plan. Some local zoning ordinances implement a comprehensive plan through development standards and regulations. Table 3.8-2 presents the major government land use plans, policies, and regulations in the study area. Requirements are largely similar in all counties, including special use permits and setback requirements for energy projects in most counties. Applicability of these plans, policies, and regulations would depend on the locations of the related renewable energy projects.

Table 3.8-2. Pertinent Local Government Land Use Plans, Policies, and Regulations, Related Renewable Energy Projects Study Area

Jurisdiction	Document Title, Date of Adoption	Relevant Plans, Policies, and/or Regulations	Notes
Antelope County	Zoning Regulations of Antelope County Nebraska as Amended July, 2012	Article 15, Wind Tower Regulations	Special use permits can be obtained in any district for wind projects; setback requirements
Cheyenne County	Zoning and Subdivision Regulations, March 2023	Section 17, Tower Regulations, Wind Generation and Communication	Building permit required for wind projects; setback requirements
Custer County	Custer County Nebraska Zoning Resolution No. 67Z-22, December 13, 2022	Section 7.06, Small Wind Energy Systems; Section 7.07, Commercial/Utility Grade Wind Energy Systems	Special use permits available for wind energy in any zoning district; setback requirements
Greeley County	Greeley County, Nebraska Zoning Regulations – 2025, Revised April 2015	Article 8.7, Wind Energy Conversion Facilities	Special use permits available for wind energy in any zoning district; setback requirements
Greeley County	Greeley County, Nebraska Comprehensive Plan – 2025, April 2015	Section 6.2, Renewable Energy Strategic Plan; Section 6.4, Wind Turbines and "Net Metering"	Special use permits available for wind energy in any zoning district; setback requirements
Holt County	Holt County Zoning Regulations, Amended and Approved – October 31, 2014	Article 5, Wind Energy Conversion Facilities	Special use permits available for wind energy in any zoning district; setback requirements
Jefferson County	Jefferson County, Nebraska Zoning Regulations, Amended 3/23/2023	Article 6.6, Small and Commercial Wind Energy Conversion System	Special use permits required in AG, AGR, C and I zoning districts for parcels at least ten acres; setback requirements; design standards apply

Jurisdiction	Document Title, Date of Adoption	Relevant Plans, Policies, and/or Regulations	Notes
Jefferson County	Jefferson County, Nebraska Comprehensive Plan Update, Amended 3/23/2023	Section 5, Energy Element	Special Use Permits required in the AG, AGR, C and I zoning districts for parcels or lots at least ten acres in size; setback requirements; design standards apply
York County	York County, Nebraska 2015 Adopted Zoning Regulations	Section 501.04, Permitted Principal Uses and Structures	Most districts are permitted to obtain a special use permit for wind; setback requirements

Sources: County of Antelope 2012; Cheyenne County Planning & Zoning 2023; The Custer County Planning Commission 2022; Greeley County, Nebraska Planning and Zoning 2015a; Greeley County, Nebraska Planning and Zoning 2015b; Holt County, Nebraska 2021; Jefferson County 2023a; Jefferson County 2023b; York County, Nebraska 2015

Existing Land Uses

Land uses in the study area include recreation, conservation, agriculture and livestock grazing, industrial activities (e.g., manufacturing and energy), right-of-way corridors (e.g., roads, railroads, transmission lines, and pipelines), and urban and rural development. Existing land cover types in the study area are shown in SEIS Section 3.5, *Vegetation*. In some instances, particularly with agricultural lands, land cover and land use can be viewed as the same.

Commercial and Industrial Development

Commercial enterprises in the study area include convenience stores; feed, seed, automobile, and machinery sales; service stations; retail stores; office buildings; bars; restaurants; wineries; art galleries; motels; and other businesses. Land is also leased for commercial and recreational purposes (e.g., hunting).

Public and Semi-Public Development

Public and semi-public land uses in the study area include public schools, childcare and preschool facilities, senior centers, long-term care facilities, churches, museums, historical markers, post offices, fire stations, libraries, water treatment and sewage disposal facilities, and cemeteries. These uses are generally located near transportation routes and/or communities.

Agriculture

Land in the study area is used primarily for agriculture and ranching. Approximately 2.1 million acres (41%) of the study area are agricultural cropland, and approximately 2.2 million acres (43%) of the study area are grasslands. Typical land cover types associated with agricultural uses include native grasslands, pasture and rangeland, and to a lesser extent, irrigated croplands. Agriculture is a predominant use in the study area with 95% of the Great Plains being used for agriculture, along with ranching, with more than 90% of the Sandhills region being large ranches (1,000 acres or more). Other livestock-related operations in the study area

include independently owned livestock feedlots and larger-scale confined livestock feeding operations.

Farmsteads are scattered throughout the study area. Most farmsteads were likely developed in areas where the soils are conducive to crop production and near a major transportation route. Farmstead development is less common in areas where the soils are not conducive to crop production, which, in most instances, is in areas with sandy soils and/or steeper slopes. Water availability is also a major factor in the presence and location of agricultural activity, especially row crop production.

Conservation Programs and Easements

Federal, state, and local agencies, as well as nongovernment conservation organizations, increasingly use conservation programs and conservation easements to protect conservation values on private lands. Several conservation easements are held by NGOs in the study area (Table 3.8-3). Because of restrictions on the disclosure of specific information about individual landowners enrolled in the CRP and Conservation Reserve Enhancement Program, it was not possible to specify all the parcels enrolled in those programs for this analysis.

Table 3.8-3. Nongovernmental Organization Conservation Easements in the Related Renewable Energy Projects Study Area

Site Name	Designation Type	County	Acres
Wetlands Reserve Program (WRP), Custer, Nebraska	Conservation Easement	Custer	37.7
WRP, Greeley, Nebraska	Conservation Easement	Greeley	586.7
WRP, Holt, Nebraska	Conservation Easement	Holt	4,426.3
Nebraska Land Trust #25	Conservation Easement	Holt	157.8
Other Stewardship Lands (OSL), Holt (31089), Nebraska	Other Easement	Holt	2.2
Grassland Reserve Program (GRP), Jefferson, Nebraska	Conservation Easement	Jefferson	103.7
WRP, Jefferson, Nebraska	Conservation Easement	Jefferson	309.1
Nebraska Land Trust #27	Conservation Easement	Jefferson	77.5
McCord Easement	Ranch Easement	Jefferson	1,027.5
WRP, York, Nebraska	Conservation Easement	York	1,436.6
Seward County Waterfowl Production Area	Conservation Easement	York	52.5

Source: National Conservation Easement Database 2023

3.8.2 Environmental Consequences

3.8.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on land use would be the same as presented in FEIS Section 3.8.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on land use would be the same as described in FEIS Section 3.8.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference, with the following differences.

The increase in estimated temporary disturbance for construction access and the addition of a construction contingency could result in effects on land use (Table 3.1-2). Permanent land conversion of agricultural areas could result in wind erosion blowing sand in the proposed transmission line area if grassland in the stabilized sand dunes is not successfully recovered after construction, affecting the function of natural areas such as conservation easements and agricultural areas. However, it can be assumed that with implementation of best practices and avoidance measures, temporarily disturbed areas would be able to fully recover into their current land cover types and retain their land use. Considering these changes, the duration and intensity of effects on land use would be the same as described for the FEIS proposed action (short and long term, low to moderate intensity).

Alternative A (FEIS Proposed Action)

The effects of Alternative A on land use would be the same as presented in FEIS Section 3.8.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures,* and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on land use would be the same as presented in FEIS Section 3.8.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference. The estimated area of temporary disturbance for Alternative B is greater than under the proposed action, however, the duration and intensity of effects would be the same as those described in the FEIS for Alternative B (short and long term, low to moderate intensity).

3.8.2.2 Related Renewable Energy Projects

The discussion of effects qualitatively describes potential effects resulting from construction, operation, and maintenance of the related renewable energy projects identified in SEIS Section 3.1.3, *Related Renewable Energy Projects*.

Consistency with Land Management Regulations, Plans, and Standards

Although the precise locations of most of the related renewable energy projects are not known, it is assumed that all proposed facilities would be sited in compliance with federal, state, and local planning regulations and local zoning. Given the presence of conservation easements in the study area, it is possible that project components would cross some lands enrolled in the Conservation Stewardship Program or CRP lands. If the related renewable energy projects were to require modifications to existing agreements with NRCS or Farm Service Agency, the developers would, with the landowner's permission, work with the agency to identify the

information needed for such modifications. If any land were to be removed from these programs due to the related renewable energy projects, the developer would reimburse affected landowners for costs incurred or losses experienced. In these ways, the related renewable energy projects would be consistent with state government regulations, plans, or standards and effects would be of low intensity in the long term.

Land Uses

The related renewable energy projects could result in adverse effects on land uses if construction, operation, and maintenance of facilities displaced, altered, or otherwise physically affected existing or planned agricultural, residential, commercial, industrial, governmental, institutional, or public or private infrastructure uses or facilities. Potential effects on existing land uses are summarized in the following sections.

Agriculture

Construction, operation, and maintenance of the related renewable energy projects would result in low- to moderate-intensity effects on agricultural land uses, based on the following factors.

- Existing land uses such as agriculture and grazing in any temporary disturbance areas would experience short-term construction-related disturbances.
- In the short and long term, land would be cleared for site access and preparation and turbine, tower, and solar panel construction.
    - Construction of wind turbines, towers, solar panels, and associated permanent access routes would require the permanent conversion of some land use types.
    - Most disturbance for these activities would be temporary and vegetation would regrow following construction, but a small percentage of disturbed acreage would be permanently removed to accommodate the wind turbines, which would affect agricultural land uses.
- In the short and long term, grazing, haying, and calving operations would experience low-intensity impacts. Effects would primarily be localized to the construction site, with the specific extent of effects varying depending on the size of the project and existing conditions at the site.

Other potential long-term impacts of renewable energy project construction in agricultural areas include the following.

- Loss of uses that are incompatible with the renewable energy project components (e.g., trees, structures, or other objects that may present fire or electrical hazards).
- Potential for wind erosion blowing sand into agricultural areas (i.e., blowouts) if grassland in the stabilized sand dunes is not successfully recovered after construction of transmission lines, causing loss of grazing area.
- Problems for turning field machinery and maintaining efficient fieldwork patterns.
- Loss of grazing and haying areas resulting from the slow rate of vegetation reestablishment.

- Increased soil erosion and loss of calving areas from the removal of shelterbelts.
- Encroachment by weeds and other pests.
- Soil compaction and drain tile damage.
- Safety hazards due to pole and tower placement.
- Removal of or interference with irrigation equipment.
- Encumbrance of future field consolidation or land subdivision.
- Hindrance or prevention of aerial spraying.

The extent of permanent effects from land conversion would depend on the underlying land cover type. For example, forested land cover may be permanently removed from the area surrounding a wind project, whereas grassland or agricultural land cover types would be allowed to regrow and return to its previous condition.

Construction activities may temporarily interfere with access to pasture lands and disturb livestock with construction noise and fugitive dust. Cattle may be temporarily relocated to accommodate construction activities. It is assumed that project developers would coordinate with landowners prior to construction activities to minimize the risk of disturbance. The duration of effects from disturbance to pasture or rangeland would depend on the time needed to restore disturbed areas to pre-project conditions and may last longer than a single season.

For all related renewable energy projects, it is assumed that project developers would apply design features to minimize or eliminate impacts on agricultural operations. Construction and operation of renewable energy facilities are expected to have long-term, low- to moderate-intensity adverse impacts on agricultural land use.

Residential, Commercial, and Other Land Use

Construction activities would create fugitive dust, noise, and traffic along existing roads and along temporary access routes to transport building materials. During construction of the related renewable energy projects, residential, commercial, industrial, and other land uses in the project area would likely continue, although some land could be temporarily disturbed. Due to local zoning regulations, renewable energy projects would likely be constructed away from dense residential areas, so long-term effects on residential land use would be of low intensity.

Depending on local zoning regulations, the related renewable energy projects might be constructed near commercial or industrial areas, but the overall land use would not be expected to change. The projects would not substantially alter the landscape and are not expected to result in any long-term effects on commercial or industrial land uses. Therefore, effects on commercial or industrial land use would be long term and low intensity.

Because of the small percentage of federal lands in the study area (<0.1%), it is unlikely that the related renewable energy projects would affect lands enrolled in federal agency programs. Any activities proposed on federal land would be required to comply with federal regulations. Therefore, any effects on federal land use would be of low intensity.

Conservation Easements

It is possible that the related renewable energy projects would intersect conservation easements based on their presence in the study area (Table 3.8-3). It is assumed that the developers would be required to comply with regulations or deed restrictions that would prevent or minimize any potential for short-term resource damage from construction activities or long-term impacts from land use conversion. If projects are constructed on easement lands, those lands would no longer provide the conservation values that triggered the original creation of the conservation easement. Construction of project facilities adjacent to conservation easements could also reduce the value of the conservation easement. The intensity of these long-term impacts would depend on the size of the project's overlap with a conservation easement, if any.

Establishment and maintenance of the projects may necessitate the permanent removal of trees and other vegetation, and the presence of wind turbines may pose a risk of collision for migratory birds, diminishing the conservation value of the easement. It is assumed that project developers would work with landowners and the conservation administrators to determine the appropriate compensation for lost conservation value in accordance with the terms and provisions of the easement document. Therefore, short- and long-term effects on conservation easements are expected to be of low intensity.

Section 3.9
Recreation and Tourism

3.9.1 Affected Environment

3.9.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.9.1, *Affected Environment*, about recreation and tourism in the study area for the proposed action and alternatives is incorporated by reference into this SEIS. Since publication of the FEIS, the John W. and Louise Seier National Wildlife Refuge (NWR) in Rock County opened to the public for recreational hunting (FWS 2020).

3.9.1.2 Related Renewable Energy Projects

Nebraska is known for its recreational and tourism-based activities that attract both domestic and international visitors. Recreational activities in the study area include biking, hunting, fishing, camping, off-highway vehicle (OHV) use, sightseeing, and wildlife viewing. The related renewable energy projects study area contains numerous Wildlife Management Areas (WMAs), Waterfowl Production Areas (WPAs), State Recreation Areas (SRAs), State Historical Parks, and other types of trails, lakes, rivers, and other recreational areas. In addition, there are private lands used for golfing, hunting, and fishing. These areas are under the jurisdiction of various federal, state, and third-party agencies, each with varying recreation and tourism goals. FEIS Section 3.9.1 describes the recreation and tourism resources found in the study area for the proposed action and alternatives. The descriptions of these types of resources, and their managing agencies, are also applicable to the related renewable energy projects and incorporated here by reference.

Wildlife Management Areas

In the study area for the related renewable energy projects, there are 18 WMAs identified and managed by Nebraska Game and Parks Commission (NGPC) (Table 3.9-1). Six are in York County, five are in Jefferson County, one is in Greeley County, and six are in Holt County. The mission of WMAs is to enhance wildlife habitat and public hunting and fishing (NGPC 2020). The state also encourages other recreational uses in these areas, including, but not limited to, nature studies, horseback riding, camping, and hiking. NGPC issues regulations and other guidance as it relates to the use of these areas for other recreational activities (NGPC 2020).

Table 3.9-1. Wildlife Management Areas in the Study Area for Related Renewable Energy Projects

Wildlife Management Area	County	Closest Project Area	Distance to Closest Project Area
Hidden Marsh WMA	York	Big Blue Nebraska	38.4 miles
Marsh Duck WMA	York	Big Blue Nebraska	45.5 miles
Spikerush WMA	York	Big Blue Nebraska	50.3 miles

Wildlife Management Area	County	Closest Project Area	Distance to Closest Project Area
Kirkpatrick Basin North WMA	York	Big Blue Nebraska	50.4 miles
Kirkpatrick Basin South WMA	York	Big Blue Nebraska	51.4 miles
Renquist Basin WMA	York	Big Blue Nebraska	63.1 miles
Rock Glen WMA	Jefferson	Big Blue Nebraska	2.7 miles
Flathead WMA	Jefferson	Big Blue Nebraska	6.5 miles
Rose Creek WMA	Jefferson	Big Blue Nebraska	9.5 miles
Alexandria WMA	Jefferson	Big Blue Nebraska	12.6 miles
Davis Creek State WMA	Greeley	Prairie Hills Wind	29.3 miles
Goose Lake WMA	Holt	Thunderhead	9.3 miles
Dry Creek WMA	Holt	Thunderhead	25.7 miles
O. John Emerson WMA	Holt	Thunderhead	38.4 miles
Redbird WMA	Holt	Thunderhead	44.8 miles
Spencer Dam WMA	Holt	Thunderhead	51.4 miles
Pressey WMA	Custer	Prairie Hills Wind	12.0 miles
Arcadia Diversion Dam WMA	Custer	Prairie Hills Wind	17.7 miles
Berggren-Young WMA	Custer	Prairie Hills Wind	21.3 miles
Davis Creek WMA	Custer	Prairie Hills Wind	29.3 miles
Red Wing WMA	Antelope	Thunderhead	2.8 miles
Hackberry Creek WMA	Antelope	Thunderhead	3.5 miles
Grove Lake WMA	Antelope	Thunderhead	15.6 miles

WMA = Wildlife Management Area

Waterfowl Production Areas

The study area for the related renewable energy projects contains five WPAs (Sinninger WPA, Waco Basin WPA, Heron WPA, Freeman Lakes WPA, and County Line Marsh WPA), all in York County. The closest related renewable energy project to these WPAs is the proposed Big Blue Nebraska Wind Project, which is located approximately 40 miles from the Sinninger WPA. WPAs are similar to wildlife refuges in that they are units in the National Wildlife Refuge System. The main difference between NWRs and WPAs is that WPAs are generally open to recreational activities, unless public safety or other concerns dictate otherwise (FWS 2023).

State Recreation Areas and Historical Parks

The study area for the related renewable energy projects includes seven SRAs identified and managed by NGPC (Table 3.9-2). There are three in York County, three in Jefferson County, and one in Holt County. The State of Nebraska identifies these as having high recreational and tourism value. Each area is managed to conserve natural resources and provide infrastructure and information to visiting recreationalists. Visitors to SRAs can engage in camping, picnicking, hiking, fishing, boating and other activities. For nonpublic lands, such as the Sawn Lake Fish Hatchery in Holt County, NGPC has an agreement with the private landowner to allow public fishing access on the lake. NGPC has similar agreements with other private landowners.

Table 3.9-2. State Recreation Areas in the Study Area for Related Renewable Energy Projects

State Recreation Area	County	Closest Project Area	Distance to Closest Project Area
Swan Lake Fish Hatchery	Holt	Thunderhead	34.5 miles
Lakeview Park Lake (Henderson Pond) Recreation Area	York	Big Blue Nebraska	41.25 miles
Overland Trail Lake Recreation Area	York	Big Blue Nebraska	53.35 miles
Bruce L Anderson Recharge Lake Recreation Area	York	Big Blue Nebraska	57.75 miles
Rock Creek Station SRA	Jefferson	Big Blue Nebraska	2.2 miles
Alexandria SRA	Jefferson	Big Blue Nebraska	12.3 miles
Buckley Creek SRA	Jefferson	Big Blue Nebraska	13.9 miles
Victoria Springs SRA	Custer	Prairie Hills Wind	29.5 miles

NGPC also manages the Rock Creek Station State Historical Park (SHP), located in Jefferson County, approximately 2 miles from the proposed Big Blue Nebraska Wind Project area. This park includes 350 acres of prairie and multiple riparian areas. The park grounds are open to visitors year-round for various recreational activities including biking, equestrian trail riding, hiking, and picnicking.

National Wild and Scenic Rivers

NPS identifies and maintains a database of National Wild and Scenic Rivers Systems. For a segment of free-flowing river to be listed in the system, the river must possess traits in one (or multiple) of the following value categories: scenery, recreation, geology, fish, wildlife, prehistory, history, and cultural. In the related renewable energy projects study area, the Niobrara River (in the northern portion of Holt County) is the only identified Wild and Scenic River. The river is frequented by recreationists and other visitors who can engage in hunting, fishing, rafting, wildlife viewing, and various other activities.

National Historic Trails

The National Trails System is managed by NPS and includes supporting National Historic Trails (NHTs), National Scenic Trails, and National Recreational Trails across the nation. These trails are recognized as historically relevant routes for past exploration, migration, and military action and include lands in both public and private ownership. Highways and other roadways commonly run parallel to these routes, providing limited public access.

There are three National Historic Trails in the study area: the Oregon National Historic Trail (ONHT), California National Historic Trail (CNHT), and Pony Express National Historic Trail (PENHT). More details regarding these historic trails are incorporated by reference (FEIS Section 3.9.1.1, *Federal Recreation Areas and Opportunities*).

The Pony Express NHT and the California NHT both enter into Cheyenne County via the northern portion and generally follow U.S. Highway (US) 385. Both trails exit Cheyenne County moving eastbound, still generally following US 385, US 30, and Interstate (I) 80. The Oregon Trail, California Trail, and Pony Express all enter into Jefferson County via the western portion and generally parallel US 136. Each trail additionally intersects State Highways 15, 103, and 8.

State Trails

Nebraska contains many trails managed by state agencies, including the NGPC. These trails provide visitors with hiking opportunities, wildlife viewing, and scenic landscape viewing. Some of these trails also support horseback riding. The related renewable energy projects study area includes 13 different state trails. The Cedar River Trail passes through Greeley County. The Cowboy Trail passes through Holt County. Additionally, there are several trails in Rock Creek Station State Historical Park in Jefferson County.

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on recreation and tourism would be the same as presented in FEIS Section 3.9.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on recreation and tourism would be the same as presented in FEIS Section 3.9.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference. In consideration of the John W. and Louise Seier NWR mentioned in SEIS Section 3.9.1, *Affected Environment*, no new or different effects on recreational resources would occur under the proposed action.

Alternative A (FEIS Proposed Action)

The types and intensity of effects of Alternative A on recreation and tourism would be the same as presented in FEIS Section 3.9.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on recreation and tourism would be the same as presented in FEIS Section 3.9.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference.

3.9.2.2 Related Renewable Energy Projects

The related renewable energy projects could affect recreational resources through reduced access or decreased quality of recreational activities due to visual degradation (SEIS Section 3.12, *Visual Resources*), air quality degradation (SEIS Section 3.13, *Air Quality and Greenhouse Gases*), or noise pollution (SEIS Section 3.14, *Noise*). Effects on those resource topics are covered in those SEIS sections and are only analyzed in this section as they pertain to recreation

and tourism. It is assumed that developers would comply with all applicable federal, state, and local laws governing the construction of renewable energy facilities, such as county zoning regulations that govern the siting of renewable energy projects (SEIS Section 3.8, *Land Use*). The workforce required for operations and maintenance would be limited and would not require the same level of heavy machinery often necessary for construction.

The temporary activities associated with the related renewable energy projects (e.g., siting, construction, maintenance, decommissioning) could result in noise, dust, traffic, and the presence of construction equipment and workers that would temporarily affect recreation activities occurring in the area. Recreational stakeholders involved in activities like camping, hunting, hiking, historical sightseeing, or wildlife viewing could be temporarily deterred from visiting recreational sites near the related renewable energy project facilities during construction. The experience of those recreating close enough to the related renewable energy projects to perceive impacts on the visual or noise setting from construction activities could be adversely impacted. Access to these recreational areas could become temporarily closed or obstructed over the course of each project's development. As discussed in SEIS Section 3.11, *Transportation*, construction and maintenance of the related renewable energy projects could require temporary, intermittent road closures that could affect access to recreational sites.

Recreational users could temporarily and intermittently be displaced by construction and, to a lesser degree, maintenance. However, short and long-term effects on access to and quality of recreational activities in the area are expected to be of low intensity.

The primary long-term effects of the related renewable energy projects would be potential reductions in visual quality caused by the presence of renewable energy facilities (i.e., wind turbines or solar panel structures) and associated infrastructure (SEIS Section 3.12, *Visual Resources*) near recreational sites. Reduced visual quality may result in decreased public interest in recreation sites close to new renewable energy infrastructure but is not anticipated to notably impact access to or quality of recreational areas.

Tables 3.9-1 and 3.9-2 show the distances between recreational resources (including wildlife protection areas, waterfowl production areas, and state recreation areas) the related renewable energy projects with proposed locations based on best available information. None of the project areas overlap with or are directly adjacent to the recreational sites identified in SEIS Section 3.9.1.2, *Related Renewable Energy Projects*, but two wildlife management areas (Rock Glen and Red Wing), one state recreation area (Rock Creek Station), and one State Historic Park (Rock Creek Station) are located within 3 miles of a known related renewable energy project area (Tables 3.9-1 and 3.9-2). As described in SEIS Section 3.12, *Visual Resources*, 3 miles corresponds to the middleground distance, beyond which views become diminished and specific project features do not typically stand out. Depending on the siting of structures associated with these related renewable energy projects, recreational users in these areas may experience decreased recreational quality related to visual effects.

Overall, short- and long-term effects on recreation from the related renewable energy projects would be of low intensity.

Section 3.10
Cultural Resources

3.10.1 Affected Environment

3.10.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.10, *Cultural Resources*, regarding cultural resources in the study area for the proposed action and alternatives is incorporated by reference into this SEIS. Select information has been updated and is described below to reflect the current status of cultural resources review under NEPA and compliance with Section 106 of the National Historic Preservation Act (NHPA).

Scoping Consultation

In a letter dated August 25, 2022, the Service notified the Advisory Council on Historic Preservation (ACHP) and the Nebraska State Historic Preservation Office (SHPO) of its intent to prepare a SEIS pursuant to NEPA. The ACHP responded on October 19, 2022, with no comments pursuant to NEPA; however, to ensure compliance with Section 106, the ACHP encouraged the Service to consider the process at the Service's earliest opportunity. The ACHP asked for clarification on how the Section 106 process would be addressed, as well as additional details about the project (Appendix G, *Section 106 Coordination and Correspondence*). The Nebraska SHPO confirmed interest to serve as a cooperating agency via email on August 26, 2022.

The Notice of Intent for the SEIS was published on November 18, 2022, and in early December of 2022, the Service held two virtual public scoping meetings. After reviewing comments from these meetings, the Service began preparing the SEIS and developed a plan for Section 106 consultation to aid in addressing some of the issues identified in the 2020 court decision.

Section 106 of the NHPA and Government-to-Government Tribal Consultation

The information presented in FEIS Sections 3.10.2, *R-Project Section 106 Consultation*, and 3.10.3, *Government-to-Government Tribal Consultation*, is incorporated into this SEIS by reference. After the ITP was issued in June 2019, consultation with the Cherokee Nation continued regarding potentially sensitive cultural sites in the study area. Prior to the court decision in 2020, a draft scope was prepared to complete a noninvasive cultural resources survey utilizing a canine forensic team, and if warranted, ground penetrating radar. However, these measures were not finalized due to the court decision.

In accordance with Executive Order 13175 and Department of Interior Secretarial Order 3206, the Service formally invited Tribal Nations to consult on a Government-to-Government basis with mailed letters in August and November 2022. On January 17, 2023, the Service met with the Nebraska SHPO and ACHP and discussed the Section 106 process and amending the *Programmatic Agreement Among the U.S. Fish and Wildlife Service – Mountain-Prairie Region, the*

Nebraska State Historic Preservation Officer, Nebraska Public Power District, and the Advisory Council on Historic Preservation Regarding the Construction, Maintenance, and Operation of the R-Project 345 Kilovolt Transmission Line, Blaine, Garfield, Holt, Lincoln, Logan, Loup, Thomas, and Wheeler Counties, Nebraska (PA). The Rosebud Sioux Tribe formally requested Government-to-Government consultation with the Service on February 16, 2023, and the Service continues to coordinate with all interested Tribal Nations on Government-to-Government consultation.

The Service formally initiated Section 106 consultation efforts for the SEIS on July 10, 2023, with a mailed letter regarding the initiation of the Section 106 process, a request for input on the area of potential effects (APE), and assistance in the identification of historic properties and traditional cultural properties in the APE, as well as an invitation to join the project as a formal consulting party.[1] The letter was mailed to 42 recipients, determined based on recipients from previous consultation efforts, as well as a review of the current APE to include additional consulting parties, and parties that expressed interest during the NEPA scoping period. All 31 Tribal Nations included in the recipients list were also invited to participate in Government-to-Government consultation, in addition to government-to-government consultation invitations sent by the Service in August and November 2022.[2] In a response letter dated July 21, 2023, the Nebraska SHPO responded with its concurrence on the APE. In a response letter dated July 19, 2023, Lincoln County Historical Museum requested interest in being a consulting party under Section 106. Appendix G contains samples of the initial consultation letter, a list of recipients, written and verbal responses received, and summaries of consultation meetings to date.

Following the distribution of the consultation letters, the Service hosted two virtual Section 106 consultation meetings on August 17 and 18, 2023. The meeting on August 17, 2023, was open to all Section 106 consulting parties, project team members, and additional interested parties. The meeting on August 18, 2023, was a closed meeting for tribal representatives intended to create a platform for tribal representatives to speak directly with the Service and share sensitive information, should they choose to. A summary of these meetings can be found in Appendix G. During the consultation meeting on August 18, 2023, the Rosebud Sioux Tribe requested a Class III survey of the entire APE to be completed by Tribal Cultural Specialists.

The Service also held a virtual meeting with the Northern Cheyenne Tribe on October 16, 2023. The Northern Cheyenne Tribe stated that they have an extensive history throughout Nebraska, and therefore, the APE is also important. The Northern Cheyenne Tribe requested a Class III survey by Tribal Cultural Specialists; if that cannot be accomplished, they requested the presence of Tribal Cultural Monitors during construction.

The Service provided the Draft Cultural Resources and Inventory Report (CRIR) to Section 106 consulting parties on November 17, 2023. On December 8, 2023, the Service hosted a virtual Section 106 meeting to discuss the Draft CRIR. Appendix G includes a summary of this meeting.

[1] Enclosure 1 of the Section 106 initiation letter dated July 10, 2023 (Appendix G) incorrectly mentions that the Service conducted outreach to previously identified consulting parties as part of the Section 106 process between June 2020 to Spring 2022.

[2] The Otoe-Missouria Tribe and the Iowa Tribe of Kansas and Nebraska were identified as potential consulting parties in 2023, after the initial government-to-government invitations were sent by the Service in August and November 2022.

Consultation in accordance with Section 106 is ongoing in order to avoid, minimize, or mitigate adverse effects on historic properties. The Service will hold additional Section 106 consulting party meetings to discuss the results of the historic property identification process, the results of the effects analysis, and the finding of effects on historic properties. After that, the Service will work with consulting parties to develop an addendum to the existing PA. The dates and locations of additional Section 106 consulting party meetings are to be determined.

Cultural Context

The study area for the proposed action and alternatives includes portions of the Central Great Plains, Nebraska Sand Hills, and High Plains Ecoregions, which contain evidence of human settlement and other activities over the last 10,000 to 12,000 years. A brief cultural context of the study area is summarized in cultural resource survey reports completed to date for the R-Project (Bedingfield 2017, 2019; Bedingfield and McKenzie 2018; Bedingfield and Tucker 2016; Bedingfield and Webb 2015).

In a letter dated September 17, 2021, the Rosebud Sioux Tribe voiced concerns regarding the lack of historical documentation in the FEIS concerning the Rosebud Sioux Tribe. The Rosebud Sioux Tribe reiterated this concern at the meeting on August 18, 2023. The Service acknowledges the historical information provided by the Rosebud Sioux Tribe in the September 17, 2021, letter. Updates to this section of the SEIS are pending further consultation with Tribal Nations and other consulting parties.

Cultural Resources Investigations

The information presented in FEIS Section 3.10.6.3, *Cultural Resource Investigations*, regarding cultural resources investigations completed in the study area between 2015 and 2018 is incorporated into this SEIS by reference. At the time of FEIS publication, Nebraska SHPO review of the 2018 cultural resources survey report was pending. The Nebraska SHPO sent a letter dated January 28, 2019, in response to the 2018 survey report. SEIS Appendix G includes this letter. The Nebraska SHPO concurred with the recommendations that sites 25LN94, 25LN105, RPCM-1, RPCM-2, RPCM-3, and isolated finds RP-IF-KB5 and RP-IF-KB6 are not eligible for listing to the NRHP.

In the 2018 survey report, archaeological site 25LN113 was recommended eligible for listing to the NRHP (Bedingfield and McKenzie 2018). NPPD modified the project design to avoid this resource, shifting a transmission line support structure approximately 100 feet to the east. POWER Engineers recommended that the newly proposed structure location be subjected to archaeological testing and recommended monitoring of construction activity on the surrounding landform (Bedingfield and McKenzie 2018:37). The Nebraska SHPO concurred with the recommendation of NRHP-eligible and the assessment of no adverse effect for site 25LN113 and provided conditions to the no adverse effect determination. The Nebraska SHPO also concurred with the recommendation regarding testing and construction monitoring at the newly proposed structure location at 25LN113 and included a conditional action that NPPD submit a report detailing the results of both the archaeological survey and construction monitoring activities. Additionally, the Nebraska SHPO requested a map detailing the survey corridor for the new transmission line support structure location for review, specifying that the

map should include the defined boundaries for sites 25LN94 and 25LN113 in relation to the location of the support structure and proposed maintenance/two-track roads, support structures, or additional ground-disturbing activities.

Regarding site RPKB-12, Nebraska SHPO stated that the site does meet the evaluative criteria for potential listing to the NRHP under Criterion D and concurred with the recommendation of no adverse effect but added conditional actions related to testing and avoidance. The Nebraska SHPO concurred that prior to construction of the transmission line support structure, the site would be subsurface tested for cultural resources. In addition, the Nebraska SHPO stated that "no transmission line support structure, vehicle two-track, or any other ground disturbing activity take place within the established boundary of site RPKB-12 or within a buffer of 100-feet of said boundary." If ground disturbing actions were required, the Nebraska SHPO noted that NPPD is required to consult with SHPO staff prior to construction, and a report documenting the findings of subsurface testing would be submitted to the SHPO for review. According to NPPD, they have subsequently engaged in micrositing to avoid placing the line within a 100-foot buffer area, and Phase II testing will occur prior to construction.

The Nebraska SHPO concurred with the recommendation that the superposition of the R-Project would create an adverse visual, auditory, and atmospheric effect to site RPKB-13 (an extension of site LN00-028) and recommended that this section of the proposed transmission line be relocated at least 5.0 miles east or west of its proposed location. The Nebraska SHPO concurred with the potential NRHP-eligibility under Criterion A but also stated that the site does meet the evaluative criteria for listing to the NRHP under Criterion D.

Additional cultural resources investigations were completed between May 15 and October 25, 2019, by POWER Engineers. A report was subsequently prepared in December 2019 (Bedingfield 2019). Approximately 230 acres were surveyed and two previously recorded archaeological sites (25LN94 and 25LN113) were revisited. Site 25LN94 was previously recommended ineligible and site 25LN113 was previously recommended eligible in 2018 (Bedingfield and McKenzie 2018). As stated previously, the SHPO concurred with these recommendations in letter dated January 28, 2019. As a result of positive shovel tests encountered at 25LN113 during the 2019 investigation, the boundary of the site has been expanded, and the previously recorded site 25LN94 is now located within the revised boundary of 25LN113. Therefore, POWER Engineers recommended that these two sites be treated as a single multi-component archaeological site, and to avoid potential disturbance to NRHP-eligible 25LN113. It was recommended that the boundary of the site be clearly fenced during construction activity. The Nebraska SHPO concurred with these findings in a letter dated January 9, 2020. Additional cultural resources surveys have been completed in 2020 and 2023 by POWER Engineers and a subsequent report detailing the results of these surveys is forthcoming.

To date, a total of 51 cultural resources have been recorded in the study area and evaluated for NRHP eligibility (Bedingfield 2017, 2019; Bedingfield and McKenzie 2018; Bedingfield and Tucker 2016; Bedingfield and Webb 2015). Table 3.10-1 provides a summary of the resources that are considered historic properties (i.e., eligible for or currently listed in the NRHP). For resources that have not yet been evaluated for listing to the NRHP, the terms "Potentially Eligible," "Unevaluated," "More Information Needed," and "Indeterminate" eligibility were used

in various source documentation (i.e., prior survey reports, SHPO letters, and Nebraska Cultural Resources Geographic Information System data). For clarity, the single term "Unevaluated" is utilized in Table 3.10-1, which denotes a resource that has not yet been formally evaluated for the NRHP. The term "Inconclusive" is utilized in Table 3.10-1 to denote an evaluated resource with a conflict or ambiguity within or between documentary sources supporting an NRHP evaluation. Identification and evaluation of cultural resources in the proposed action and alternatives study area is ongoing.

Table 3.10-1. Resources in the Study Area for the Proposed Action and Alternatives

Resource Number	Name	Description	NRHP Status
LN00-028	O'Fallon's Bluff, Oregon-California National Historic Trail[a]	From the NPS, "A section of bluffs about 20 miles long that sits next to the south side of the Platte River," which tens of thousands of travelers were forced to traverse on their way to the west	Listed
LN00-032	Sutherland State Aid Bridge	Constructed 1914/1915; 14 span, concrete spandrel-arch bridge, measuring 7,950 feet long and 16 feet wide.	Listed
RPKB-12	Ballagh Schoolhouse	Historic period school	Unevaluated
RPKB-3	Sand Hill Ruts, Mormon Pioneer National Historic Trail	Four linear wagon road traces	Eligible
RPKB-1	Old Highway 83/U.S. Route 183 (segment)	18-mile abandoned segment of former highway alignment.	Inconclusive
LO00-001	Ranch Complex	Circa 1905 ranch with a frame house, small brick house, garage, workshop, barn, shop/garage, small outbuildings and corral.	Unevaluated
LO03-017	House	Circa 1901 frame house	Unevaluated
LO03-018	House	Circa 1901 frame house	Unevaluated
RPKB-5	Paxton-Hershey Canal (segment)	1-mile segment of the approximately 20-mile-long canal that irrigates cropland between the North and South Platte rivers. Associated features include two bridges, two pump houses, a historic artifact scatter and side gates.	Inconclusive
25LN113	Birdwood Creek	Prehistoric archaeological site with lithics, chipped stone tool fragments, fire-cracked rock and bone fragments.	Determined Eligible
BL00-008	St. John's Lutheran Church	1947 church and associated parsonage.	Eligible
HT00-238	House	Historic period frame house	Unevaluated
TM00-040	Blue Star Highway Rest Area	Historic period rest area	Unevaluated
TM00-041	Figard Sod House	Remains of a sod house, along with a cellar, privy, frame barn, and hay shed.	Inconclusive
WH00-001	Building	Historic period abandoned farmstead	Unevaluated

WH00-003	Building	Historic period abandoned farmstead	Unevaluated
WH00-004	Theo Pofahl Farmstead	Historic period farmstead	Unevaluated

[a] O'Fallon's Bluff is listed on the NRHP; in 2018, Power Engineers delineated 13 trail traces (Site RPKB-13) and recommended to SHPO that they were also NRHP-eligible. Traces designated as RPKB-2 are within the boundaries of the NRHP-listed LN00-028. The Nebraska SHPO boundary for LN00-28 is not consistent with the NRHP listing, as it incorporates the southern portion of the designated historic property as well as an additional area of approximately 77 acres located beyond the NRHP-listed property boundary.

Tribal Resources

This section describes resources in the study area for the proposed action and alternatives that are important to Tribal Nations. These resources can have natural, spiritual, and cultural value and are being identified during the consultation process.

Water is considered sacred to many Tribal Nations. It is an important aspect of tribal subsistence and cultural practices and is a sacred element that ensures physical and psychological well-being (Larned 2018). In a letter dated September 17, 2021, the Rosebud Sioux Tribe expressed concerns about Ogallala Aquifer, which underlies the study area. The Rosebud Sioux Tribe stated that water is considered a traditional cultural property and that water is used in ceremony, water is medicine, and water is life. The Rosebud Sioux Tribe reiterated these concerns at the Section 106 meeting held on August 18, 2023. Potential impacts on the Ogallala Aquifer are discussed in SEIS Section 3.3, *Water Resources*.

Traditional Cultural Properties

The information presented in FEIS Section 3.10.1.2, *Identifying Historic Properties*, regarding Traditional Cultural Properties (TCPs) is incorporated into this SEIS by reference. The identification of any additional TCPs would require assistance from Tribal Cultural Specialists from Tribal Nations with ancestral ties to the study area. To date, no TCP surveys have been conducted in the study area. In a letter dated September 17, 2021, the Rosebud Sioux Tribe stated that many cultural sites significant to the Sicangu Lakota are located in the Nebraska Sandhills and requested that a TCP survey be conducted. The Rosebud Sioux Tribe also reiterated this concern at the Section 106 meeting on August 18, 2023. In a virtual meeting on October 16, 2023, the Northern Cheyenne Tribe requested a Class III survey by Tribal Cultural Specialists, and, if that cannot be accomplished, requested that Tribal Cultural Monitors be present during construction. Consultation with Tribal Nations is ongoing in order to identify, evaluate, and mitigate potential effects on TCPs.

3.10.1.2 Related Renewable Energy Projects

The types of cultural resources in the related renewable energy projects study area would be similar to those discussed in FEIS Section 3.10 and include prehistoric archaeological resources (i.e., villages, open camps, and lithic scatters) and historic-age resources (i.e., farmsteads, schoolhouses, post offices, cemeteries, churches, commercial buildings, houses, gas stations, jails, bridges, ranches, canals, roads, and trails). The FEIS description of these types of resources is therefore incorporated by reference into this SEIS. A total of 41 NRHP-listed historic properties are located in the related renewable energy projects study area (Appendix G).

3.10.2 Environmental Consequences

FEIS Table 3.1-2 defines the intensity of effects on cultural resources and is incorporated into this SEIS by reference. These terms (low, moderate, and high intensity) correspond to the Section 106 determinations of "no effect," "no adverse effect," and "adverse effect" on historic properties. Adverse effects under Section 106 are those that diminish characteristics qualifying historic properties for inclusion in the NRHP, and as a result diminish the integrity of the historic property's location, design, setting, materials, workmanship, feeling, or association.

3.10.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on cultural resources would be the same as presented in the FEIS Section 3.10.7.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on cultural resources would be the same as described in FEIS Section 3.10.7.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, with the following revisions.

The FEIS proposed action route included an overhead crossing of the remnant trail segments immediately west of the O'Fallon's Bluff site, an NHRP-listed historic property associated with remnant segments of the Oregon-California National Historic Trails. No structures were proposed to be placed on any remnant trail segments. In response to the June 2020 court decision, which stated that the Service violated the NHPA by not considering routing alternatives around the O'Fallon's Bluff site, NPPD investigated route adjustments that would avoid or minimize adverse effects on this historic property. As described in Chapter 2, the current proposed action shifts a segment of the transmission line approximately 0.5 mile east from its location in the FEIS proposed action. This eliminates the overhead crossing of the trail ruts located on or immediately west of the O'Fallon's Bluff site (Figure 2-1) and creates additional physical separation between the proposed transmission line and this historic site, in an attempt to minimize physical, auditory, and visual effects. After the shift to the east, the current proposed route continues north/northwest and then west to rejoin the original route.

Identification, evaluation, and assessment of effects of cultural resources in accordance with Section 106 is ongoing. Consultation with consulting parties is also ongoing. Potential effects on the Ogallala Aquifer, a resource important to Tribal Nations, are discussed in SEIS Section 3.3, *Water Resources*.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on cultural resources would be the same as presented in FEIS Section 3.10.7.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures,* and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Construction Only, Proposed Action Route)

The types and intensity of effects of Alternative B on cultural resources would be the same as presented in FEIS Section 3.10.7.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference with the following revisions. The estimated area of temporary disturbance for Alternative B is greater than under the proposed action, which could result in more disturbance to cultural resources depending on the location of the disturbance as compared to the resources. The route adjustment described for the proposed action would also apply to Alternative B and is intended to minimize adverse physical, auditory, and visual effects on O'Fallon's Bluff under this alternative.

3.10.2.2 Related Renewable Energy Projects

Although specific effects on cultural resources would be determined on a site-specific basis, it is assumed that all developers would comply with applicable federal, state, and county regulations. The types of effects described in this section could be of low, moderate, or high intensity (including potentially significant adverse impacts) depending on the exact timing and location of the project, but adverse effects would likely be minimized or mitigated by developers adhering to applicable federal, state, and county requirements.

Construction, operation and maintenance, and decommissioning of the related renewable energy projects, including both wind energy and solar energy, have the potential for high-intensity effects on cultural resources.

Construction activities that involve earthmoving (e.g., grading, excavating) have the highest potential for significant impacts or high-intensity, long-term effects on cultural resources; pedestrian and vehicular traffic and indirect impacts of earthmoving activities (e.g., erosion) may also have an effect. Construction activities could result in short-term visual, auditory, and atmospheric impacts on important cultural resources that require integrity of location, setting, or feeling to convey their historical significance (e.g., buildings, sacred landscapes, or historic trails).

Site preparation and construction activities, such as the installation of access roads where existing roads are not present or improvements to existing roads to make them suitable for project construction, may have high-intensity effects on cultural resources. Construction of new access roads, which would generally only be required for remote sites, would result in ground clearing that could also have long-term, high-intensity effects on cultural resources; there is the potential for surface and sub-surface compaction of the soil by trucks and equipment that could crush some types of artifacts, features, and historic structures. Bringing workers and creating new access roads into project areas could also increase the potential for looting of cultural artifacts. Due to the weight and length of wind turbines, the grade of access routes must be kept to a minimum. Maintaining minimal grades can require extensive grading, thus increasing the potential for long-term, high-intensity effects on cultural resources due to ground disturbance. Water is a sacred resource to Tribal Nations, and construction activities could impact groundwater quality. Potential effects of the related renewable energy projects on groundwater are discussed in SEIS Section 3.3, *Water Resources*.

Section 3.11
Transportation

3.11.1 Affected Environment

3.11.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.11.1, *Affected Environment*, about transportation in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.11.1.2 Related Renewable Energy Projects

The related renewable energy projects study area contains numerous roads, railways, and airports in areas that could be affected by construction sites and increased traffic volume. In addition, local, state, and federal agencies have specific, jurisdictional authority and guidance depending on the transportation infrastructure in question.

Roadways

The related renewable energy projects study area contains several federal and state highways, local roads, service roads, and nonpaved motorized roadways. For all state highways and interstates, the Nebraska Department of Transportation (NDOT) has jurisdictional authority and responsibility of design, care, and maintenance. For other rural expressways or rural municipality roads, incorporated municipalities throughout the renewable energy projects study areas are responsible for design, care, and maintenance.

The primary traffic types in the study area are passenger and commercial vehicles. The primary roadways in the study area include Interstate (I) 80 and U.S. Highways (US) 183, 281, 20, 81, 34, 136, and 281. In addition, state highways in the study area include Nebraska Highways (NE) 19, 17E, 17F, 2, 22, 56, 91, 11, 70, 95, 45A, 45B, 93A, 93B, 69, 8, 15, 103, 774, and 4. Highways that intersect with the proposed Prairie Hills Wind project area include US-183 and NE-7. Highways that intersect with the proposed Big Blue Nebraska project area include US-136 and NE-103. Highways that intersect with the Thunderhead Wind Energy Center (Thunderhead) project area include NE-70.

Beyond the federal and state highway infrastructure, there are several rural paved and nonpaved roadways present in the study area. These roads are organized in a grid pattern and are near town centers.

I-80 acts as the highest traffic volume corridor in the region. On an annual average, the daily traffic volume across I-80 is 18,000 vehicles per day (NDOT 2023). The volume of traffic measured on other federal and state highways ranges from 530 vehicles per day on State Highway 4, to 5,600 vehicles per day on US-81.

Railways

The Federal Railroad Administration (FRA) regulates and manages the nation's railroad infrastructure and oversees both commercial and passenger freight. Notable railroads that pass through Nebraska include service lines for shipping and Amtrak lines used by private citizens. There are numerous railroad stations and tracks that pass through the related renewable energy projects study area. These railroad lines include the Union Pacific Railroad, the BNSF Railway, and railways from the Nebraska Central Railroad Company (NCRC). The BNSF Railway intersects with a portion of the proposed Prairie Hills Wind project area and the Union Pacific Railroad intersects with a portion of the proposed Big Blue Nebraska project area.

Airports

The Federal Aviation Administration (FAA) regulates and manages the nation's airports and other aviation-based infrastructure. FAA oversees both public and private airfields. These airfields use FAA-approved instrument procedures and rules employed in FAA jurisdictional airspace. The following FAA-regulated airports are in the study area counties: Sidney Municipal Airport Lloyd W. Carr Field (Cheyenne County), Stuart-Atkinson Municipal Airport (Holt County), O'Neil Municipal John L. Baker Field (Holt County), York Municipal Airport (York County), Fairbury Municipal Airport (Jefferson County), Antelope County Airport (Antelope County), Broken Bow Municipal/Keith Glaze Field Airport (Custer County) (NebraskaMap 2020).

The Broken Bow Municipal/Keith Glaze Field and Antelope County airports are the only airports near a related renewable energy project area. The Broken Bow Municipal/Keith Glaze Field Airport is approximately 16 miles away from the proposed Prairie Hills Wind project area. The Antelope County Airport is approximately 3.5 miles away from the Thunderhead project area.

3.11.2 Environmental Consequences

3.11.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on transportation would be the same as presented in FEIS Section 3.11.2.1, *No-action Alternativ*e, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on transportation would be the same as presented in FEIS Section 3.11.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on transportation would be the same as presented in FEIS Section 3.11.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structure*s, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on transportation would be the same as presented in FEIS Section 3.11.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference.

3.11.2.2 Related Renewable Energy Projects

Construction of the related renewable energy projects could result in effects on roadway transportation due to increased traffic volumes and the potential for temporary road closures during construction. Construction is not anticipated to have any permanent effects on circulation or transportation infrastructure quality. Project developers would be assumed to comply with all applicable federal, state, and local regulations related to the transportation of materials required for the related renewable energy projects, including NDOT permitting requirements for overweight or oversized vehicles and vehicle loads. Project developers may also prepare a traffic management plan that addresses site access and potential hazards from construction-related traffic and effectively incorporates applicable federal and state standards for road design, construction, and maintenance during all project stages.

Construction of the related renewable energy projects would not be anticipated to result in effects on railroad or aviation transportation infrastructure, given that project developers would be required to coordinate construction plans with applicable FAA and FRA standards. For example, depending on project size and proximity to airports, wind and solar projects in the vicinity of public airports would be required to comply with 14 Code of Federal Regulations Part 77.9, and project developers would need to coordinate with FAA prior to construction to ensure that operation of the projects would not cause hazards for air navigation (e.g., visual impacts or glares that pose safety hazards to pilots or air traffic controllers) and that appropriate marking and lighting standards for wind turbines are followed. Per Nebraska Revised Statutes 3-401 et. Seq., project developers would also file notice with the Nebraska Department of Aeronautics before construction or alteration of any structure that exceeds 150 feet above the ground surface and would obtain a permit to build for such structures.

Long-term, operational effects of the related renewable energy projects on transportation would consist of daily commuter traffic for staff operating the facilities and intermittent access of larger trucks or equipment for site maintenance.

Short- and long-term effects of the related renewable energy projects on transportation would be of low intensity.

Section 3.12
Visual Resources

3.12.1 Affected Environment

3.12.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.12.1, *Affected Environment*, about visual resources and affected viewers in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

In addition to these resources, the Nebraska Land Trust holds the Horseshoe Bar Ranch conservation easement, located west of Highway 83 and encompassing portions of the Dismal River. The Horseshoe Bar Ranch is a historic ranch located in the Nebraska Sandhills. The visual landscape around the Highway 83 crossing of the Dismal River is very scenic and offers picturesque views of the winding river and rolling grasslands that are dotted with evergreen trees. A scenic overlook located off Highway 83, north of the river, provides sweeping views of this landscape.

3.12.1.2 Related Renewable Energy Projects

As discussed in SEIS Section 3.8, *Land Use*, the related renewable energy projects study area is generally characterized by a rural landscape of ranchland, flat to gently rolling prairies, grassland, farmland, loess hills, the Great Plains, and the Sandhills, a stabilized sand dune complex. Where the landscape is flat, expansive scenic vista views that extend to the background (i.e., views beyond 3 miles from the viewer) are often provided over grasslands that lack mature tree cover. In other areas, mature trees limit views of the rangelands to the foreground (i.e., up to 0.25 mile from viewer) or middleground (i.e., 0.25 to 3 miles from viewer). Where the terrain is rolling, views may be limited by terrain or be more expansive from elevated vantages. Common features in this predominantly rural landscape include scattered residences and agricultural structures (e.g., barns, silos, steel storage buildings), wooden- or steel-post and wire fences, wooden- and steel-poled utility lines that line roadways, a patchwork of row crops and grasslands, and a grid system of roadways. Views of this predominantly rural landscape range from moderate to moderately high in visual quality because of the lack of human-made features. The vividness ranges from moderate and typical of the region to moderately high and more scenic in nature. Intactness and unity tend to range from moderate, where utility lines may detract from the landscape, to moderately high, where utility lines are not present or are in the middleground or background and do not stand out as a focal point in views.

Sensitive federal visual resources in or within three miles of the study area were evaluated. Three miles corresponds to the outer limit of middleground views. Views become diminished beyond the middleground, and specific project features do not typically stand out in background views. However, visual features in background views (e.g., mountain ranges, water

features) can be contributing visual elements to the study area where project elements would affect views of such features. The sensitive federal visual resources that were evaluated include National Heritage and Historic Sites/Areas, National Lakeshores, National Memorials and Monuments, National Parks, National Scenic Areas, National Trails, Scenic Byways/All-American Roads, U.S. National Forests, Wild and Scenic Rivers, Wildlife Refuges, National Heritage and Historic Sites/Areas. Of these resources, the following occur in or within 3 miles of the study area (Federal Highway Administration 2023; National Park Service 2023; National Wild and Scenic Rivers System 2023; U.S. Department of Agriculture Forest Service 2023; FWS 2023).

- **Sandhills Journey National Scenic Byway:** Custer County, including the Prairie Hills Wind project area that crosses the scenic byway at Mason.
- **California and Pony Express National Historic Trails:** Cheyenne County.
- **California, Oregon, and Pony Express National Historic Trails:** Jefferson County, including the Big Blue Nebraska project area, which is approximately 1.75 miles northeast of the trails' shared alignment.

Although the Niobrara River is a National Wild and Scenic River located close to Holt County, the eastern extent of the river's Wild and Scenic designation ends at Highway 137, which is approximately 4 miles west of Holt County and outside of the study area. Therefore, this Wild and Scenic River is not considered in the visual analysis. The study area also has visual resources that are protected at the state level, including wildlife management areas, waterfowl production areas, state recreation areas and historical parks, and state trails (SEIS Section 3.9, *Recreation and Tourism*). In addition, the following state-designated scenic byways occur in or within 3 miles of the study area (Nebraska Department of Roads 2012).

- **Gold Rush Byway (Highway 385)**: Cheyenne County.
- **Outlaw Trail Scenic Byway (Highway 12):** Holt County.
- **Loup Rivers Scenic Byway (Highway 11):** York County.
- **Heritage Highway (Highway 136):** Jefferson County, including the proposed Big Blue Nebraska project area that crosses or abuts Highway 136 between 574th Avenue, east of Jansen, and 581st Avenue, east of Harbine.

Affected viewers in the study area broadly include private residential viewers; travelers on roadways; recreationists; and workers and patrons of commercial, industrial, civic, and institutional businesses. Generally, higher visual sensitivity is attributed to residential viewers, who have longer-term views and a higher sense of ownership of views, as well as recreational viewers, who tend to have a higher regard for and acuity to changes in the natural and built environments. Lower visual sensitivity is generally attributed to roadway commuters who tend to be focused on driving and business workers and patrons who are more focused on work activities and engaged in shopping or receiving services. Recreational roadway travelers have higher sensitivities than roadway commuters because recreational roadway travelers often take routes for their scenic qualities.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on land use would be the same as presented in FEIS Section 3.12.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on visual resources would be the same as presented in FEIS Section 3.12.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, except for the following differences.

As described in SEIS Section 2.4, *Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP)*, modifications to the proposed action that affect visual resources include the removal of the majority of the Holt County Substation from the proposed action because it has been constructed, a reroute to eliminate the overhead crossing of the trail ruts located on or immediately west of the registered O'Fallon's Bluff site, an increase in total estimated disturbance associated with construction access; the addition of a construction contingency disturbance area; using bird flight diverters along the entirety of the proposed transmission line and on other Nebraska Public Power District (NPPD)-owned power lines; and using low-temperature light-emitting diode (LED) lighting at substations and temporary work areas instead of sodium vapor lighting.

Marking the entirety of the proposed transmission line and 124 miles of existing NPPD-owned power lines within 1 mile of suitable whooping crane stopover habitat with bird flight diverters would make the power lines stand out more in the landscape because movement of the diverters in the wind would draw viewers' attention to the lines. However, use of the diverters for bird safety outweighs the increase in visual impact from including the diverters on the lines.

The proposed action would affect views associated with the Nebraska Land Trust's Horseshoe Bar Ranch conservation easement, located west of Highway 83 along the Dismal River. The Horseshoe Bar Ranch is a historic ranch located in the Nebraska Sandhills. The Sandhills are stabilized sand dunes and construction of the proposed project would have the potential to create growing areas of exposed and blowing sand (i.e., "blowouts"). Blowouts occur when the grassland becomes disturbed and grassland restoration, which is difficult, fails. If blowouts occur in this area, they would have the potential to affect the historic landscape associated with the ranch, views of the sensitive grasslands, introduce areas of exposed and blowing sand, and alter views from the scenic overlook. The R-Project line would also introduce prominent steel monopoles structures into a landscape where there are currently only wooden utility poles that blend with the grassland landscape, being made of natural materials. Introduction of prominent steel monopoles into this area would introduce an industrial-looking utility feature into a rural and historical landscape and create a visual focal point and distraction that would alter views available from the scenic overlook. As a result of these changes, the visual landscape around the

Highway 83 crossing of the Dismal River has the potential to be degraded by the proposed action. A scenic overlook located off Highway 83, north of the river, provides sweeping views of this landscape. Overall, the proposed action would have a high-intensity impact on the visual quality of views associated with this location.

The transmission line reroute around O'Fallon's Bluff would have a similar effect as described in the FEIS. Viewpoints 1 and 2 (Figure 3.12-1) illustrate the effects of the proposed action near the reroute. Viewpoint 1 is located north of the reroute and adjacent to the Sand Hill Ruts (RPKB-2). As described in the FEIS, "views of the Project elements would be prominent from the highway, which does not have structures or power lines in the existing landscape setting. The most prominent structures would be steel monopoles. The existing visual quality of the landscape is medium, and viewers are expected to have medium sensitivity to visual quality." At this location, the terrain helps to reduce the prominence of the utility corridor compared to a flat landscape, as the rolling landscape hides poles that are on the slopes that are out of view. However, the proposed action would introduce large steel monopoles that are prominent in views to the north and south due to their height, circumference, and repetitive and linear nature of poles and wires seen in the view (Figures 3.12-2 and 3.12-3). Although passing views of the Sand Hill Ruts would remain visible under the power lines and between monopoles to viewers traveling along North Prairie Trace Road, as seen in Figure 3.12-4, which shows a vantage located underneath the power lines between monopoles 34 and 35, the proposed action would introduce an industrial-looking utility feature into a rural and historical landscape.

Viewpoint 2 is located just south of I-80, to the east of the FEIS proposed action alignment and west of the proposed action alignment. Although the tall steel monopoles would be visible in the distance when looking north, their coloring enables them to recede somewhat into views, as seen in Figure 3.12-5. The proposed action alignment would be less impactful on this viewpoint than the FEIS proposed action alignment, which would be immediately adjacent to this viewpoint and readily visible crossing the ruts. Conversely, the proposed action mostly retains the context of the rural view. The proposed action would, however, disrupt the vividness, intactness, and unity of the scene by backdropping this rural and historical landscape associated with the ruts and California, Oregon, and Pony Express National Historic Trails by introducing an industrial-looking utility feature in the distance. As seen in the vantage looking northeast (Figure 3.12-6), the proposed alignment is visible and detracts from the view, but it echoes the verticality of the fence posts that are in the immediate foreground and the darkly colored light posts that are in the left of the view. In addition, the terrain obscures the bottom portions of the monopoles so that only the upper portions are visible. Therefore, although the proposed action detracts from the quality of the view, the alignment does not appear fully out of context. The proposed action alignment also echoes the verticality of the fence posts that are in the immediate foreground when looking to the southeast (Figure 3.12-7). However, the poles are more visually apparent when looking in this direction because the terrain is flatter, and the monopoles are readily visible in their entirety. Similarly, when looking south (Figure 3.12-8), the poles associated with the proposed action repeat the lines of the fence posts in the foreground and silos and structures in the background of the view. However, as with the other views from this viewpoint, the proposed action would disrupt the vividness, intactness, and unity of the scene by backdropping this rural and historical landscape associated with the NRHP-registered O'Fallon's Bluff site and the ruts of the California, Oregon, and Pony Express

National Historic Trails by introducing an industrial-looking utility feature in the distance. This impact is anticipated to be less under the proposed action than under the FEIS proposed action alignment because the FEIS proposed action alignment (Figure 3.12-9) crosses the California, Oregon, and Pony Express National Historic Trails ruts immediately adjacent to the registered O'Fallon's Bluff site and is more prominent in the view. Overall, effects on the visual quality of views from Viewpoints 1 and 2 would be of moderate intensity.

Long-term impacts on visual character and quality of other viewpoints would be the same as described for the FEIS proposed action (ranging from low to high intensity).

Due to the addition of construction access and the construction contingency, the estimated area of temporary disturbance for the proposed action is greater than that of the FEIS proposed action. However, as temporarily disturbed areas would be able to fully recover into their current land cover types and retain their visual character and quality, short-term effects from construction would be the same as described for the FEIS proposed action (low intensity).

Using LED lighting with a correlated color temperature (CCT) of 3500 Kelvin (K) or lower at substations and temporary work areas, instead of sodium vapor lighting, would ensure that lighting maintains a warm color temperature. This would also avoid the use of blue-rich white light LED lamps that have a CCT of 4000 K or higher that can negatively affect humans by increasing nuisance light and glare, in addition to increasing ambient light glow, if proper shielding is not provided (American Medical Association 2016; International Dark-Sky Association 2010a, 2010b, 2015). Studies have found that a 4000 K blue-rich white LED light causes approximately 2.5 times more light pollution than high-pressure sodium lighting with the same lumen output, which would affect sensitive receptors and more than double the perceived brightness of the night sky (Aubé et al. 2013; Falchi et al. 2011, 2016). Using blue-rich white LEDs would result in a substantial source of nighttime light and glare that would adversely affect nighttime views in the area without shielding employed, especially in rural areas where nighttime lighting levels are low to very low. However, this effect is anticipated to be less under the proposed action than the FEIS proposed action because although the use of low-temperature LEDs may increase nighttime lighting in rural areas, specifying the use of LEDs with a low CCT would ensure that blue-rich white light lamps are avoided. Therefore, short- and long-term effects of proposed lighting would be of low intensity with such measures applied.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on visual resources would be the same as presented in FEIS Section 3.12.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference, with the following differences. Figure 3.12-9 includes a comparison of Alternative A to the proposed action at Viewpoint 2 (just south of I-80). Effects on the visual quality of views from the Horseshoe Bar Ranch conservation easement (west of Highway 83 along the Dismal River), which are not addressed in the FEIS, would be the same as under the proposed action.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on visual resources would be the same as presented in FEIS Section 3.12.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference. Like the proposed action, Alternative B includes a minor reroute, added line marking, and potential effects on visual quality of views from the Horseshoe Bar Ranch conservation easement, for which the same effects would occur under Alternative B. Overall, effects would be the same as described in the FEIS for Alternative B.

3.12.2.2 Related Renewable Energy Projects

Temporary Construction Impacts

Construction of the related renewable energy projects would introduce considerable heavy equipment and associated vehicles, including backhoes, compactors, tractors, and trucks into the viewshed of all viewer groups. Construction of the projects would require the following temporary facilities on the site: assembly areas, access roads, parking areas, and staging and laydown areas. Slowly moving dust clouds would attract attention from visual receptors and reduce the availability of short-range views if dust control measures were not implemented during construction. Although construction activities would temporarily introduce heavy equipment into the landscape, it would be like the heavy equipment used in agricultural production that is common to the related renewable energy projects study area. Due to the temporary nature of construction, these short-term impacts would be of low intensity.

Visual Character and Quality

Unobstructed views of regional topographical features and undeveloped lands would be less available as areas are developed with photovoltaic panels, wind turbines, and associated transmission lines, access roads, and related infrastructure (e.g., security fencing, energy storage systems, substations, etc.). Solar projects would convert natural grasslands or agricultural lands that are farmed to linear rows of industrial-looking, darkly colored solar panels. Wind farms would introduce towering structures with spinning blades that would be seen rising above the flat planes or following along the ridgelines of the rolling terrain. Depending on project siting, the changes in visual character and quality associated with related renewable energy projects would have the potential to affect sensitive visual resources such as scenic vistas and the federal and state scenic byways and national historic trails identified in SEIS Section 3.12.1.2, *Related Renewable Energy Projects*. The total effects of the related renewable energy projects would be long term and of moderate to high intensity, depending on project siting.

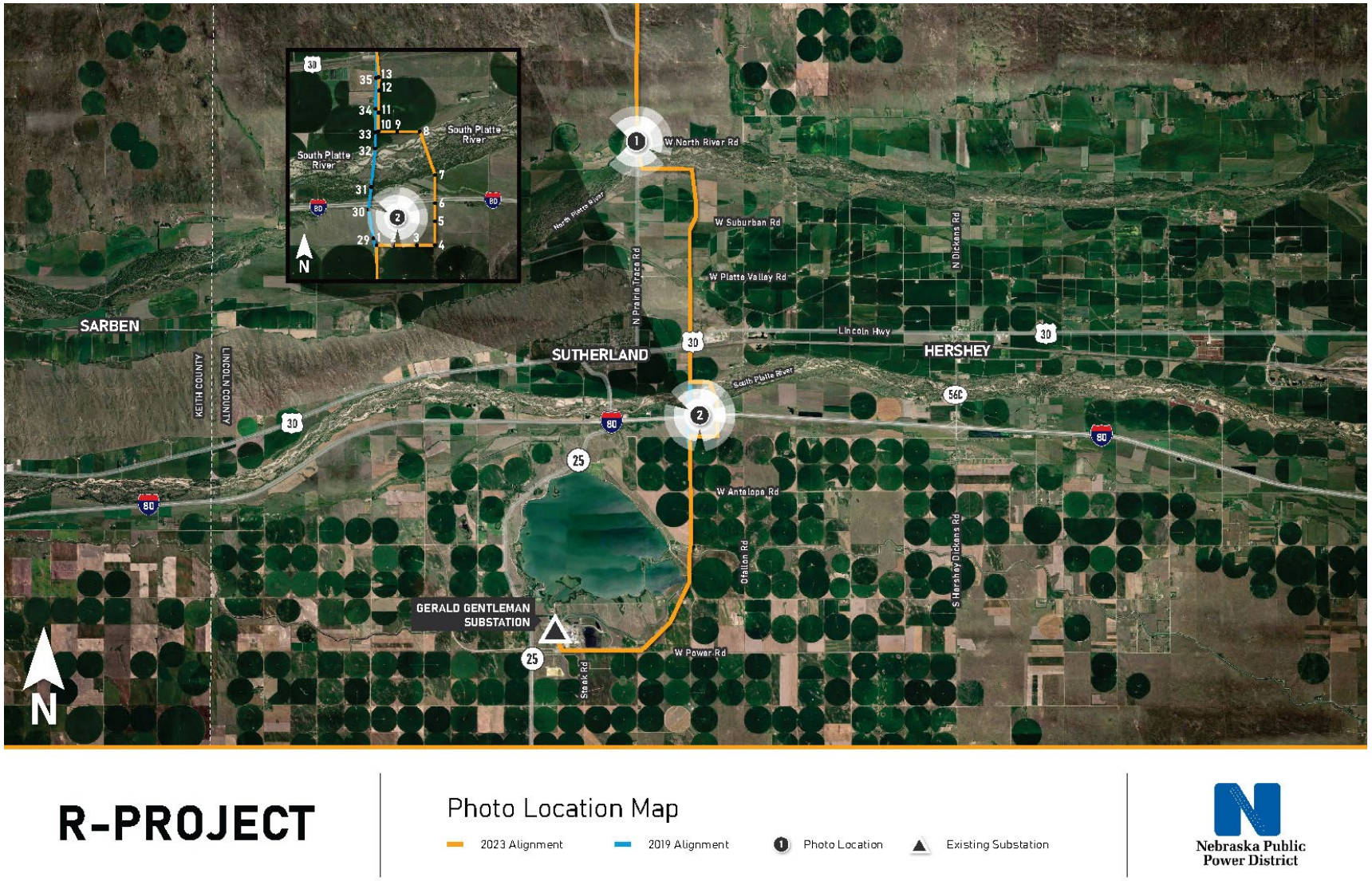


Figure 3.12-1. Photo Location Map

Figure 3.12-2. Viewpoint 1, Viewing North

Figure 3.12-3. Viewpoint 1, Viewing South

Figure 3.12-4. Viewpoint 1, Viewing Northeast

Figure 3.12-5. Viewpoint 2, Viewing North

Figure 3.12-6. Viewpoint 2, Viewing Northeast

Figure 3.12-7. Viewpoint 2, Viewing Southeast

Figure 3.12-8. Viewpoint 2, Viewing Southwest, Proposed Action

Figure 3.12-9. Viewpoint 2, Viewing Southwest, Alternative A

Site-specific changes in visual character and quality would occur at the proposed Prairie Hills Wind and Big Blue Nebraska project areas. The proposed Prairie Hills Wind project area is gently rolling with few visual intrusions in the landscape. Highways 2 and 183 are the major travel routes that provide the greatest visual access to the project area, in addition to the rural roadways that are used by local traffic to provide access to the small number of rural residences, ranches, and farms that are scattered throughout the project area. Highway 2 is part of the Sandhills Journey National Scenic Byway, which intersects with the northeastern boundary of the proposed Prairie Hills Wind project area. In certain locations, the highways are bordered by groupings of mature evergreen or deciduous trees that, combined with the rolling terrain, limit views from the highways to the foreground. Other vantages from the highway allow for middleground views over the rolling landscape, such as from the apex of hills. Background views are rare due to the terrain mostly preventing such views. The proposed Prairie Hills Wind project area is large, and the site-specific placement of wind turbines in the landscape would greatly affect the turbines' potential to impact views. The visibility of the turbines would likely range from being fully visible to only the upper portions or tops of the turbines and turbine blades being visible, given the hilly terrain and, in places, mature trees that could obscure portions of the turbine body from view. The presence of large turbines would draw viewers' attention toward them and the numerous turbines would become a focal point that creates a new visual intrusion in the landscape that would clutter public views available from roadways with tall turbines sticking up and across the hillsides and ridgelines. These changes could also affect the Sandhills Journey National Scenic Byway if turbines are placed within view of the scenic corridor.

The proposed Big Blue Nebraska project area is flat, with few visual intrusions in the landscape. Highway 136 is the major travel route that provides the greatest visual access to the project area, in addition to rural roadways that are used by local traffic to provide access to the rural communities of Jansen, Harbine, and Ellis and rural residences, ranches, and farms scattered throughout the project area. Highway 136 is also part of the Heritage Highway State Scenic Byway, which travels midway through the proposed Big Blue Nebraska project area. In certain locations, Highway 136 and State Route 106 are bordered by groupings of mature evergreen or deciduous trees that limit views from the roadway corridor to the foreground. However, most vantages from the roadway corridor allow for middleground to background views over the flat, agricultural landscape. The project area is relatively large, and the site-specific placement of wind turbines in the landscape would greatly affect the turbines' potential to impact views. The visibility of the turbines would likely range from being fully visible to only the upper portions or tops of the turbines and turbine blades being visible where mature trees obscure portions of the turbine body from view. The presence of large turbines would draw viewers' attention toward them, and the numerous turbines would become a focal point that creates a new visual intrusion in the landscape that would clutter public views available from roadways with tall turbines sticking up and across the hillsides and ridgelines. These changes could also affect the Heritage Highway State Scenic Byway if turbines are placed within view of the scenic corridor. The shared alignment of the California, Oregon, and Pony Express National Historic Trails is located southwest of the proposed Big Blue Nebraska project area. There is a low possibility that turbines associated with the project would be visible from the trail alignment due to low,

rolling hills and mature trees that would likely prevent views of the turbines from the historic trails.

The total effects of the Prairie Hills Wind and Big Blue Nebraska projects would be long term and of moderate to high intensity, depending on the location in which turbines are built.

Light and Glare

The related renewable energy projects (solar and wind) could cause long-term effects related to increased daytime and nighttime glare and light. For solar projects, it is anticipated that the solar arrays would have dark panels. Most solar panels reflect light back up into the atmosphere, so potential receptors of glare would mostly be aircraft. Modern solar panels reflect less than 3% of incoming sunlight (Anurag et al. 2017). However, glare comparable to that coming off flat water can still result, but this would not be a hazard for aircraft (Riley and Olson 2011). Generally, turbines are painted dull white or light gray and in areas where no turbines currently exist, their presence could be a new source of glare. In addition, shadow flicker could result in high-intensity visual impacts if turbines are sited close to residential land uses. Shadow flicker is caused when sunlight or moonlight shines on rotating wind turbine blades, casting intermittent shadows of the rotating blades to create regularly spaced intervals of light and dark that result in a flickering effect. While shadow flicker can be seen outside, it is more pronounced indoors where the shadows enter through a window or door opening and the flickering effect is confined within a walled room. Proper siting of wind projects would preclude shadow flicker as an impact, and the completion of shadow flicker studies could be used in instances where there is uncertainty surrounding the potential for shadow flicker impacts.

Solar projects would require security lighting for their facilities, which could have long-term, adverse effects on nighttime views in rural and developed areas. The adverse effects of LED lighting on nighttime views are described above for the proposed action, and similar effects from nighttime LED lighting could occur during construction and operation of the related renewable energy projects. This could result in a substantial source of nighttime light and glare that would adversely affect nighttime views in the area if lighting were not properly designed and shielding is not employed, especially in rural area where nighttime lighting levels are low to very low. Project-specific mitigation could be required to ensure that LED lighting avoids the use of blue-rich white light lamps. Wind turbines would likely require Federal Aviation Administration lighting. This could affect daytime and nighttime views in the related renewable energy project area where existing sources of such lighting is expected to be limited. Overall, it is expected that short-term and long-term effects from changes in daytime and nighttime glare and light would be of moderate intensity.

Section 3.13

Air Quality and Greenhouse Gases

3.13.1 Affected Environment

3.13.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.13.1, *Affected Environment*, about air quality and greenhouse gases (GHGs) in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

There have been several recent updates to federal guidance regarding GHG reductions and renewable energy development. Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, was established in January 2021 to "deliver an equitable, clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050" (86 FR 7619-7633). More recently, CEQ published a notice in January 2023 titled "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change." The Federal Register notice highlighted that "major federal actions may result in substantial GHG emissions or emissions reductions, so federal leadership that is informed by sound analysis is crucial to addressing the climate crisis" (88 FR 1196-1212).

Though Nebraska does not have established Renewable Portfolio Standards or carbon reduction requirements, other statewide initiatives encourage renewable energy development. NPPD established a Strategic Directive in December 2021, known as the Carbon Emission Reductions (BP-SD-05) directive. The goal of the directive is to achieve net zero carbon emissions by 2050 through the continued use of proven, reliable generation until alternative, reliable sources of generation are developed (NPPD 2021). The directive also seeks to reduce carbon emissions by using certified offsets, energy efficiency projects, lower or zero carbon emission generation resources, beneficial electrification projects, or other economic and practical technologies at costs that are equal to, or lower than, current resources (NPPD 2021).

3.13.1.2 Related Renewable Energy Projects

The information presented in FEIS Sections 3.13.1.1, *National Ambient Air Quality Standards/Attainmen*t; 3.13.1.2, *Greenhouse Gases*; 3.13.1.3, *Fossil-Fueled Equipment*; and 3.13.1.4, *Vegetation Disturbance*, is relevant to the related renewable energy projects. These sections are incorporated by reference into this SEIS. The recent updates to federal guidance about GHG reductions and renewable energy development described above in SEIS Section 3.13.1.1, *Proposed Action and Alternatives,* are also applicable to the related renewable energy projects. All counties in the related renewable energy projects study area have achieved attainment in all criteria pollutant categories (EPA 2023).

3.13.2 Environmental Consequences

3.13.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on air quality and GHGs would be the same as presented in FEIS Section 3.13.2.1, *No-action Alternative*, which is incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on air quality and GHGs would be the same as presented in FEIS Section 3.13.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference, except for the following differences. The relative increases in estimated temporary disturbance for construction could result in an increase in emissions. These localized increases in emissions from construction would not change the overall intensity of effects described for the FEIS proposed action (short-term, low- to moderate-intensity). Emissions from these construction activities would dissipate and would not lead to exceedances of the National Ambient Air Quality Standards (NAAQS) or exceed EPA mandatory reporting thresholds for GHG emissions; therefore, long-term effects to air quality would be the same as described for the FEIS proposed action (low intensity).

Alternative A (FEIS Proposed Action)

The types and intensity of effects of Alternative A on air quality and GHGs would be the same as presented in FEIS Section 3.13.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, which is incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on air quality and GHGs would be the same as presented in FEIS Section 3.14.3.2, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference. The estimated area of temporary disturbance for Alternative B is greater than under the proposed action, resulting in potentially greater emissions. However, the intensity of effects would be the same as those described in the FEIS for Alternative B (low intensity).

3.13.2.2 Related Renewable Energy Projects

Construction of the related renewable energy projects would lead to a short-term increase in fugitive dust emissions, exhaust emissions from fossil-fueled equipment and construction vehicles, and increased GHG emissions caused by disturbances to vegetation. It is also possible that regional wind circulation patterns could carry fugitive dust and other particulate emissions generated by construction beyond the related renewable energy projects study area.

Operation of the related renewable energy projects would have long-term, beneficial effects on air quality in the region, given that the energy produced by these projects would likely displace energy produced by fossil-fueled power plants, which result in the emissions of various pollutants. Additionally, these projects would reduce GHG emissions to the extent that the energy produced displaces energy produced by carbon-intensive sources of power generation (e.g., fossil fuels). These reductions in GHG emissions would contribute incrementally to mitigating climate change. In addition, GHG emissions reductions would further the goals of Executive Order 14008, CEQ's NEPA guidance on GHGs and climate change, and NPPD's strategic directive to decrease carbon emissions by increasing the use of renewable energy and decreasing GHG emissions.

Emissions produced during operation and maintenance would slightly decrease the net emissions reductions expected from the related renewable energy projects. Emissions associated with construction (short-term) and operation and maintenance (long-term) of the related renewable energy projects are not expected to lead to exceedances of the NAAQS or exceed EPA mandatory reporting thresholds for GHG emissions. Overall, air quality and GHG impacts would be of low intensity.

Section 3.14
Noise

3.14.1 Affected Environment

3.14.1.1 Proposed Action and Alternatives

The information presented in FEIS Sections 3.14.1, *Acoustic Principles*, and 3.14.2, *Affected Environment*, about noise in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.14.1.2 Related Renewable Energy Projects

The information in FEIS Section 3.14.1 remains relevant to the related renewable energy projects. As such, the general details of this section are incorporated by reference into this SEIS. The study area for related renewable energy projects contains various potential sensitive noise receptors. The most common noise receptors include commercial buildings, churches, houses, schools, cemeteries, and other types of outbuildings. Other sensitive noise receptors may include wildlife habitat, such as national wildlife refuges or other protected areas. These receptors occur throughout the study area.

Sensitive noise receptors in the vicinity of the known renewable energy project areas include:

- The proposed Prairie Hills Wind project area overlaps with several farms and rural communities including part of the Village of Mason City and is near the Villages of Litchfield (approximately 2.5 miles) and Hazard (approximately 6.5 miles).
- The proposed Big Blue Nebraska Wind project area spans several rural farms and communities, including the entirety of the Village of Harbine, and is near the City of Fairbury (approximately 5 miles).
- The Thunderhead Wind Energy Center (Thunderhead) project area overlaps with several farms and dispersed residences and is near the Village of Clearwater (approximately 3.5 miles), the City of Neligh (approximately 4 miles), and the City of Elgin (approximately 3 miles).

3.14.2 Environmental Consequences

3.14.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on noise would be the same as presented in FEIS Section 3.14.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on noise would be the same as presented in FEIS Section 3.14.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on noise would be the same as presented in FEIS Section 3.14.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on noise would be the same as presented in FEIS Section 3.14.3.2, *Alternative B: Tubular Steel Monopole Structures Only,* and are incorporated into this SEIS by reference.

3.14.2.2 Related Renewable Energy Projects

Types of effects from construction of the related renewable energy projects would be similar to those described in the FEIS for the proposed action and alternatives. While there is limited knowledge of the impacts on specific noise receptors due to the lack of project-specific information, significant impacts are not expected. Sensitive noise receptors may experience noise levels elevated above what is typical of the area during construction. The intensity of effects would depend on several factors, such as the types of equipment and amount of ground disturbance required. It is assumed that developers would comply with all federal, state, and local laws applicable to the construction of renewable energy facilities, including guidance related specifically to noise pollution (e.g., construction noise limits, required setbacks from residential receptors). Construction effects on sensitive noise receptors would be short term and of low to moderate intensity, depending on the proximity of projects to sensitive receptors.

Noise from the operation of renewable energy facilities varies depending on the infrastructure, equipment used, and energy type. For example, the operation of wind projects generates noise from the running of wind turbines. Noise levels from wind turbines depends on wind speed, slope, and other geographical characteristics. Solar facilities typically create less noise pollution given the absence of mechanical components or moving parts, although equipment such as trackers, invertors, transformers, and transmission lines may generate background noise.

Sensitive receptors in the proposed Prairie Hills Wind and Big Blue Nebraska project areas could experience the short and long-term noise impacts described above. However, as stated above, it is assumed that developers would comply with all federal, state, and local laws applicable to the construction of renewable energy facilities. The Thunderhead project is already constructed, so noise effects would be limited to those from operation of the project at 300 MW capacity (SEIS Section 3.1.4.2, *Environmental Effects*) which would increase the number or amount of running wind turbines, increasing noise effects. Overall, long-term operational effects from the related renewable energy projects would be of low intensity.

Section 3.15
Hazardous Materials and Hazardous Waste

3.15.1 Affected Environment

3.15.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.15.1, *Affected Environment*, about hazardous materials and hazardous waste in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.15.1.2 Related Renewable Energy Projects

The information presented in FEIS Sections 3.15.1.1, *Federal Statutes and Implementing Regulations*, and 3.15.1.2, *State of Nebraska Statutes and Implementing Regulations*, are applicable to the related renewable energy projects. As such, this information is incorporated by reference into this SEIS to provide the affected environment for the related renewable energy projects.

Superfund sites are sites recognized by EPA as having experienced hazardous waste releases which have notably contaminated one or multiple onsite resources. These sites are identified and tracked for clean-up by EPA with guidance from the Comprehensive Environmental Response, Compensation and Liability Act (EPA 2022). There are two sites in York County (EPA 2023).

While EPA sponsors several programs which encourage renewable energy development on superfund sites and brownfields, these facilities are required to undergo additional environmental reviews, community engagement opportunities, and stakeholder consultations (EPA 2010).

3.15.2 Environmental Consequences

3.15.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on hazardous materials would be the same as presented in FEIS Section 3.15.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on hazardous materials would be the same as presented in FEIS Section 3.15.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures,* and are incorporated into this SEIS by reference.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on hazardous materials would be the same as presented in FEIS Section 3.15.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on hazardous materials would be the same as presented in FEIS Section 3.15.2.3, *Alternative B: Tubular Steel Monopole Construction Only*, and are incorporated into this SEIS by reference.

3.15.2.2 Related Renewable Energy Projects

Construction of the related renewable energy projects would require numerous hazardous materials and generate hazardous wastes. Operation and maintenance of these projects could also require the long-term, intermittent use of hazardous materials. Typical hazardous materials and waste streams generated by renewable energy facilities can include polychlorinated biphenyls (PCBs), oils, insecticides, fungicides, rodenticides, hydraulic fluids, antifreeze, fuels, and other types of synthetic lubricants. Material impacts could arise from accidental spills or discharges resulting in onsite soil or water contamination. Additionally, developers would need to be thoroughly trained in response actions in the event of a spill or release. It is assumed that developers would comply with all applicable federal, state, and local policies regarding hazardous materials management. Overall, construction and operation effects of the related renewable energy projects on hazardous materials and hazardous waste would be short- and long-term and of low intensity.

Section 3.16
Health and Safety

3.16.1 Affected Environment

3.16.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.16.1, *Affected Environment*, about health and safety in the study area for the proposed action and alternatives is incorporated by reference into this SEIS.

3.16.1.2 Related Renewable Energy Projects

The information presented in FEIS Sections 3.16.1.1, *Regional Setting*, 3.16.1.2, *Electric and Magnetic Fields*, 3.16.1.3, *Regulatory Framework*, and 3.16.1.4, *Potential Health Effects*, is applicable to the related renewable energy projects. As such, this information is incorporated by reference into this SEIS to provide the affected environment for the related renewable energy projects. The following sections provide additional context regarding aspects of the affected environment as it relates to the related renewable energy projects.

Shadow Flicker

Shadow flicker, described in detail in SEIS Section 3.12, *Visual Resources,* is a visual impact from rotating wind turbine blades. In general, shadow flicker is a phenomenon in which populations sited near active wind turbines experience a constant flicker or movement of light while in a building. This effect occurs as the blades of the turbine pass between the sun and a property. Exposure to shadow flicker can become a visual annoyance for communities located near turbine structures (DOE 2022). While current data suggests that the health effects connected to shadow flicker are negligible, there are potential risks to individuals with pre-existing conditions. As summarized by Knopper and Ollson (2011), flicker from turbines that interrupt or reflect sunlight at frequencies greater than 3 hertz pose a potential risk of inducing photosensitive seizures in 1.7 people per 100,000 of the photosensitive population. For turbines with three blades, this translates to a maximum speed of rotation of 60 revolutions per minute. The normal practice for large wind farms is at frequencies well below this threshold.

Electric and Magnetic Field Exposure

As noted in FEIS Section 3.16.1.2, *Electric and Magnetic Fields*, electric and magnetic field (EMF) exposure is an aspect of the affected environment related to transmission infrastructure. The FEIS references a World Health Organization (2012) report that stated the following.

> Based on a recent in-depth review of the scientific literature, the World Health Organization concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields…Despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if electromagnetic fields do have an

effect on cancer, then any increase in risk would be extremely small. The results to date contain many inconsistencies, but no large increases in risk have been found for any cancer in children or adults.

3.16.2 Environmental Consequences

3.16.2.1 Proposed Action and Alternatives

No Action Alternative

The effects of the no action alternative on health and safety would be the same as presented in FEIS Section 3.16.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on health and safety would be the same as presented in FEIS Section 3.16.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on health and safety would be the same as presented in FEIS Section 3.16.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on health and safety would be the same as presented in FEIS Section 3.16.3.2, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference.

3.16.2.2 Related Renewable Energy Projects

Health and safety concerns during construction, operation, and maintenance of the related renewable energy projects would be similar to those described in the FEIS for the proposed action and alternatives. Potential short- and long-term effects include those related to heavy equipment use, hazardous materials exposure, risks related to working at heights, potential for electric shock, and exposure to weather extremes. While there are risks to workers and the public associated with construction, operation, and maintenance of renewable energy infrastructure, it is assumed that developers would abide by all applicable federal, state, and local laws to effectively safeguard the health and safety of workers, the public, and nearby agricultural or wildlife uses. Project-specific health and safety plans would be developed to provide guidance and training for daily operational safety and any emergency situations. During construction, operation, and maintenance of renewable energy facilities, workers would be effectively trained to respond to occupational hazards regarding the use of heavy equipment and exposure to high-voltage areas.

Long-term effects associated with the related renewable energy projects include potential exposure to low frequency EMFs. Siting of collector lines required for the related renewable energy projects would be assumed to comply with all federal, state, and local laws applicable to the construction of renewable energy facilities, including requirements for setbacks from residential receptors, which could reduce potential effects associated with EMFs. While EMF exposure remains a notable concern in some local communities where energy projects are being developed, available data suggests the health and safety impacts would be minimal.

Shadow flicker created by related renewable energy projects limited to daylight hours, more likely affecting viewers during early and late hours of the day and during the winter season when the sun's angles are lower. Shadow flicker would contribute to both visual and setting impacts, in addition to potential health issues caused by daytime light strobing effects. This effect can be disorienting or disruptive to observers. Additional data suggests that photosensitive individuals, or those with related pre-existing conditions, could be at greater risk of seizures or related episodes. Siting wind projects away from residential areas would reduce the effects of shadow flicker. The completion of shadow flicker studies could also be used in instances where the potential for shadow flicker impacts is a local concern.

Short- and long-term adverse impacts on health and safety from the construction, operation, and maintenance of the related renewable energy projects are anticipated to be of low intensity.

Section 3.17
Socioeconomics

3.17.1 Affected Environment

3.17.1.1 Proposed Action and Alternatives

The socioeconomic information presented in FEIS Section 3.17.1, *Affected Environment*, is incorporated by reference into this SEIS with changes described in this section. Overall, demographics and economic conditions in the study area for the proposed action and alternatives have only seen minor changes since preparation of the FEIS. Select information has been updated to reflect the current socioeconomics of the study area.

Table 3.17-1 shows the 2020 population in each study area county and in the total study area. These figures represent a slight decrease in population from the 2014 statistics presented in the FEIS. Poverty rates (Table 3.17-2) and unemployment rates (Table 3.17-4) have declined from the values presented in the FEIS. The study area has seen a slight increase in diversity, with the "white alone" population decreasing by from 1 to 9% in each county (Table 3.17-3).

Table 3.17-1. Population by County, Proposed Action and Alternatives Study Area, 2020

County	2020
Antelope	6,295
Blaine	431
Brown	2,903
Cherry	5,455
Garfield	1,813
Holt	10,127
Hooker	711
Lincoln	34,676
Logan	716
Loup	607
McPherson	399
Rock	1,262
Thomas	669
Wheeler	774
Total	66,838

Source: USCB 2020

Table 3.17-2. Median Household Income and Percent Population below Poverty Level, Proposed Action and Alternatives Study Area, 2020

County	Median Household Income ($)	% of Population below Poverty Level
Antelope	52,569	10.8%
Blaine	55,268	8.7%
Brown	41,979	7.2%
Cherry	55,431	7.8%
Garfield	54,659	10.8%
Holt	60,214	8.6%
Hooker	48,654	8.6%
Lincoln	59,995	11.0%
Logan	45,990	8.6%
Loup	46,111	6.2%
McPherson	51,932	8.0%
Rock	51,458	9.9%
Thomas	59,000	7.3%
Wheeler	48,438	12.5%
Nebraska	63,015	10.3%

Sources: USCB 2013, 2020

Table 3.17-3. Racial and Ethnic Characteristics, Proposed Action and Alternatives Study Area, 2020

County	White Alone	Black Alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some Other Race alone	Population of two or more races
Antelope	94.3%	0.3%	0.3%	0.3%	0.0%	1.5%	3.2%
Blaine	92.1%	0.2%	0.0%	0.0%	0.0%	0.1%	0.4%
Brown	91.8%	0.1%	0.2%	0.1%	0.0%	1.7%	1.8%
Cherry	88.5%	0.2%	4.6%	0.1%	0.0%	0.6%	4.4%
Garfield	97.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.8%
Holt	93.4%	0.4%	0.8%	0.8%	0.0%	3.8%	4.4%
Hooker	93.5%	0.6%	0.1%	0.0%	0.0%	0.0%	0.6%
Lincoln	88.5%	1.2%	3.4%	5.2%	0.1%	14.9%	33.1%
Logan	94.4%	0.0%	0.0%	0.1%	0.0%	0.0%	0.6%
Loup	93.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.5%
McPherson	94.7%	0.0%	0.1%	0.0%	0.0%	0.0%	0.2%
Rock	96.9%	0.2%	0.0%	0.0%	0.0%	0.1%	0.4%
Thomas	94.2%	0.0%	0.1%	0.0%	0.0%	0.1%	0.5%
Wheeler	95.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Nebraska	90.7%	0.8%	9.7%	6.8%	0.1%	22.9%	51.4%

Source: USCB 2020

Table 3.17-4. Annual Labor Force and Unemployment Rate, Proposed Action and Alternatives Study Area, 2020

County	Labor Force	Unemployment Rate
Antelope	3,356	1.9%
Blaine	209	1.0%
Brown	1,280	0.4%
Cherry	2,982	0.1%
Garfield	975	0.0%
Holt	5,364	0.8%
Hooker	326	1.0%
Lincoln	18,016	2.3%
Logan	429	0.6%
Loup	347	0.0%
McPherson	259	0.0%
Rock	679	0.8%
Thomas	312	0.0%
Wheeler	369	1.9%
Nebraska	1,046,926	1.8%

Source: UCSB 2020

3.17.1.2 Related Renewable Energy Projects

The study area for socioeconomic effects of the related renewable energy projects includes the eight counties that contain the related renewable energy projects.

Demographic Characteristics

Population

The eight counties in the study area are rural in character and sparsely populated. Small populations are concentrated in incorporated villages and communities located primarily along major transportation routes. York County has the highest population of the study area counties and Wheeler County has the lowest (Table 3.17-5).

Table 3.17-5. Population by County, Related Renewable Projects Study Area, 2020

County	2020
Antelope	6,295
Cheyenne	9,468
Custer	10,545
Greeley	2,188
Holt	10,127
Jefferson	7,240
Wheeler	774
York	14,125

Source: USCB 2020

Most study area counties saw a decrease in population over the last decade, except for York County, which saw a 3.4% increase (USCB 2020). Statewide, the rural population has been decreasing since the mid-1900s and the urban population has been increasing since the early 1900s (University of Nebraska-Lincoln 2022). Antelope, Custer, Holt, Jefferson, York, Wheeler, and Greeley Counties are expected to decline in population over the next 30 years and Cheyenne County is expected to plateau (Center for Public Affairs Research, University of Nebraska at Omaha 2022).

Income and Poverty

All but one of the counties in the study area had median household incomes lower than the statewide median of $66,644, with county averages ranging from $48,472 (Greeley County) to $67,938 (Wheeler County) (Table 3.17-6). Half of the counties had poverty rates higher than the statewide average (Cheyenne, Custer, Greeley, and Wheeler Counties), and poverty rates for six of the counties are above 10%. Exceptions are Holt and York Counties, with poverty rates of 8.6% and 8.2%, respectively. The highest poverty rate is 13.5% in Greeley County.

Table 3.17-6. Median Household Income and Percent Population below Poverty, Related Renewable Projects Study Area, 2020

County	Median Household Income	% Below Poverty
Antelope	$55,802	10.8%
Cheyenne	$53,674	11.60%
Custer	$57,715	12.00%
Greeley	$48,472	13.50%
Holt	$60,592	8.60%
Jefferson	$51,587	10.70%
Wheeler	$67,938	12.5%
York	$66,337	8.20%
Nebraska	$66,644	10.8%

Source: USCB 2020

Racial and Ethnic Characteristics

Similar to the entire state of Nebraska, the counties in the study area have small minority populations (Table 3.17-7). The proportion of the total population reported as “white alone” is lowest in Custer County (90.0%) and highest in Cheyenne County (96.1%), compared to a statewide proportion of 78.4%.

Table 3.17-7. Racial and Ethnic Characteristics, Related Renewable Energy Projects Study Area, 2020

County	White Alone	Black or African American alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some Other Race alone
Antelope	93.7%	0.3%	0.3%	0.3%	0.0%	1.8%
Cheyenne	96.1%	0.0%	0.2%	0.3%	0.0%	1.7%
Custer	90.0%	0.6%	0.5%	0.8%	0.0%	3.0%
Greeley	90.5%	1.2%	0.6%	0.7%	0.0%	2.8%
Holt	94.1%	0.5%	0.4%	0.2%	0.0%	1.4%
Jefferson	93.4%	0.4%	0.5%	0.5%	0.0%	2.4%
Wheeler	95.1%	0.0%	0.3%	0.0%	0.0%	1.9%
York	92.1%	0.3%	0.6%	0.2%	0.0%	2.5%
Nebraska	92.1%	0.6%	0.5%	0.5%	0.0%	2.4%

Source: USCB 2020

Economic Conditions

Labor forces in the study area counties generally follow total population patterns. The largest labor force is in York County (7,156 persons in 2020). Five counties have labor forces between 3,000 and 6,000 persons. Greeley and Wheeler Counties have the smallest labor forces at 1,043 persons and 369 persons, respectively (Table 3.17-8). Since 2010, labor forces in these counties have remained fairly stable. For the most part, unemployment rates were relatively low (below 5%) for all study area counties and statewide between 2010 and 2020. Rates were lowest in 2006 and 2007, then started increasing, reaching their highest levels between 2009 and 2011, likely because of the recession of 2007 to 2009 and the following period of slow recovery.

Agriculture is a key economic driver in the study area. Ranching and farming account for more than 14% of full- and part-time employment in the study area counties. The only industry that employs more people in the study area counties is the educational services, health care, and social assistance sector, at 22%. Ranch and farm employment is higher than it is statewide (4.1%), while the educational services, and health care and social assistance sector employs a similar proportion of people in the study area counties as statewide (24.4%). Retail trade also accounts for portions of employment in the study area counties (12%).

Table 3.17-8. Annual Labor Force and Unemployment Rate, Related Renewable Energy Projects Study Area, 2020

County	Labor Force	Unemployment Rate
Antelope	3,358	1.9%
Cheyenne	4,880	1.80%
Custer	5,502	1.30%
Greeley	1,043	1.10%
Holt	5,364	0.80%
Jefferson	3,587	1.00%
Wheeler	369	0.00%
York	7,156	2.40%
Nebraska	1,053,466	1.80%

Sources: USCB 2020

3.17.2 Environmental Consequences

3.17.2.1 Proposed Action and Alternatives

No Action

The effects of the no action alternative on socioeconomics would be the same as presented in FEIS Section 3.17.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference. Although the affected environment has changed (e.g., population numbers), the overall conclusions of the analysis remain the same.

Proposed Action

The types and intensity of effects of the proposed action on socioeconomics would be the same as what was presented in FEIS Section 3.17.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, for the FEIS proposed action and are incorporated into this SEIS by reference. Although the affected environment has changed (e.g., population numbers), the overall conclusions of the analysis remain the same.

Alternative A (FEIS Proposed Action)

The effects of Alternative A on socioeconomics would be the same as presented in FEIS Section 3.17.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference. Although the affected environment has changed (e.g., population numbers), the overall conclusions of the analysis remain the same.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on socioeconomics would be the same as presented in FEIS Section 3.17.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and

are incorporated into this SEIS by reference. Although the affected environment has changed (e.g., population numbers), the overall conclusions of the analysis remain the same.

3.17.2.2 Related Renewable Energy Projects

Demographic Characteristics

Population

Because renewable energy construction requires specialized expertise and workforce, construction workers required for the projects would likely relocate to or near the study area counties for the construction period, temporarily increasing the population in these counties. However, workers may temporarily reside in cities outside study area counties to find lodging or take advantage of additional amenities offered in larger cities. These temporary population increases would result in short-term, low-intensity effects on populations in the study area, which may be noticeable depending on the location of the project and location of the workforce.

Because populations and unemployment rates are low, many of the permanent employees needed for the related renewable energy project development would likely come from outside the study area. However, these increases are not expected to change the overall population trends in the study area. Therefore, any permanent population increases would result in long-term, low-intensity effects.

Income and Poverty

Renewable energy projects could potentially result in a short-term, low-intensity increase in income in study area counties due to the increase of construction jobs. Increases in income could result in higher year-over-year increases in median household income for counties where construction workers reside during construction, but this effect would be temporary and would not likely be noticeable in the study area counties.

Construction could potentially result in a short-term, low-intensity decrease in poverty rates in the study area counties. Poverty rates in some counties could be directly affected if construction jobs are filled by local residents with current incomes below the poverty level. However, any decreases in poverty rates would likely be small because residents would be limited to a small number of jobs that perform more general work activities. Additionally, any decreases in poverty rates would be temporary, lasting through the completion of construction.

Permanent jobs associated with the operation and maintenance of related renewable energy projects are not expected to change the overall income or poverty levels in the study area; therefore, effects on income and poverty would be long term and low intensity.

Racial and Ethnic Characteristics

The addition of construction workers for the temporary construction period would not likely result in a noticeable effect on racial and ethnic characteristics in the study area counties. Because the construction workers would likely leave the study area once the projects are completed, any potential changes in racial and ethnic characteristics would be short term and

low intensity. Permanent jobs associated with the operation and maintenance of related renewable energy projects are not expected to change the overall racial or ethnic characteristics in the study area; therefore, effects on racial and ethnic characteristics would be long term and low intensity.

Economic Conditions

A small number of local construction workers could be retained to perform jobs involving more general activities. However, because of the tight labor market, as reflected by low unemployment rates (less than 5%) (Table 3.17-8), and because some specialized construction workers would be required, most of the construction workforce would likely come from outside the region. Because few local workers would likely be hired for construction, and few permanent jobs are expected to be created in the study area for operation and maintenance of the proposed projects, any potential increases in employment and decreases in unemployment associated with the projects would be low intensity.

During construction of related renewable energy projects, there could be financial losses from disruption in agricultural operations or temporary land disturbance; these adverse effects would be short term and could range from low intensity to moderate or high intensity depending on the exact location and timing of the projects.

Once the related renewable energy projects are operational, there could be beneficial effects on the local and regional economy. Retail and service industries could see an increase in permanent workers expenditures associated with operations and maintenance of the constructed wind farms or solar farms. This could result in induced growth of retail and commercial services and infrastructure, resulting in long-term, low-intensity beneficial effects.

Section 3.18
Environmental Justice

3.18.1 Affected Environment

3.18.1.1 Proposed Action and Alternatives

The information presented in FEIS Section 3.18.1, *Affected Environment*, is incorporated by reference into this SEIS. However, select information has been updated below to reflect the current environmental justice indicators in the study area for the proposed action and alternatives. Additionally, since the publication of the FEIS, the 2023 Executive Order (EO) 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, further built upon the federal government's commitment to strengthen environmental justice initiatives (88 FR 25251). EO 14096 requires that environmental reviews analyze direct, indirect, and cumulative effects of federal actions on communities with environmental justice concerns; consider best available science on disparate health effects arising from exposure to environmental hazards; and provide opportunities for early and meaningful involvement in the environmental review process by communities with environmental justice concerns potentially affected by a proposed action.

Consistent with the methodology used in the FEIS, the study area for minority populations includes those census blocks that are within 0.5 mile of the proposed transmission line route, and the study area for low-income populations includes those census tracts that are within 0.5 mile of the proposed transmission line route. This area is expected to capture the residents most likely to be adversely affected by the proposed action and alternatives through increased traffic, noise, and fugitive dust, as well as impacts on existing land uses and visual and aesthetic resources. The FEIS used data from the 2010 Decennial Census; the updated SEIS study area was analyzed using the most recent 2020 Decennial Census data. See Figure 3.18-1 for an overview of census tracts and blocks in the study area.

Presence of Environmental Justice Minority Populations

Consistent with the FEIS, the threshold for identifying an environmental justice minority area is if the minority population exceeds 50% of the total population in the evaluated area, or the minority population percentage is more than 10% greater than the benchmark or reference region. Results can be seen in Table 3.18-1 and Figure 3.18-2.

Compared to the FEIS, the study area for the proposed action and alternatives contains fewer minority populations. Per the definition above, there are no environmental justice minority areas in the study area. Compared to the reference region (Nebraska), only one census block group in Loup County had a higher minority percentage than the state average (14.3% vs. 12.5%).

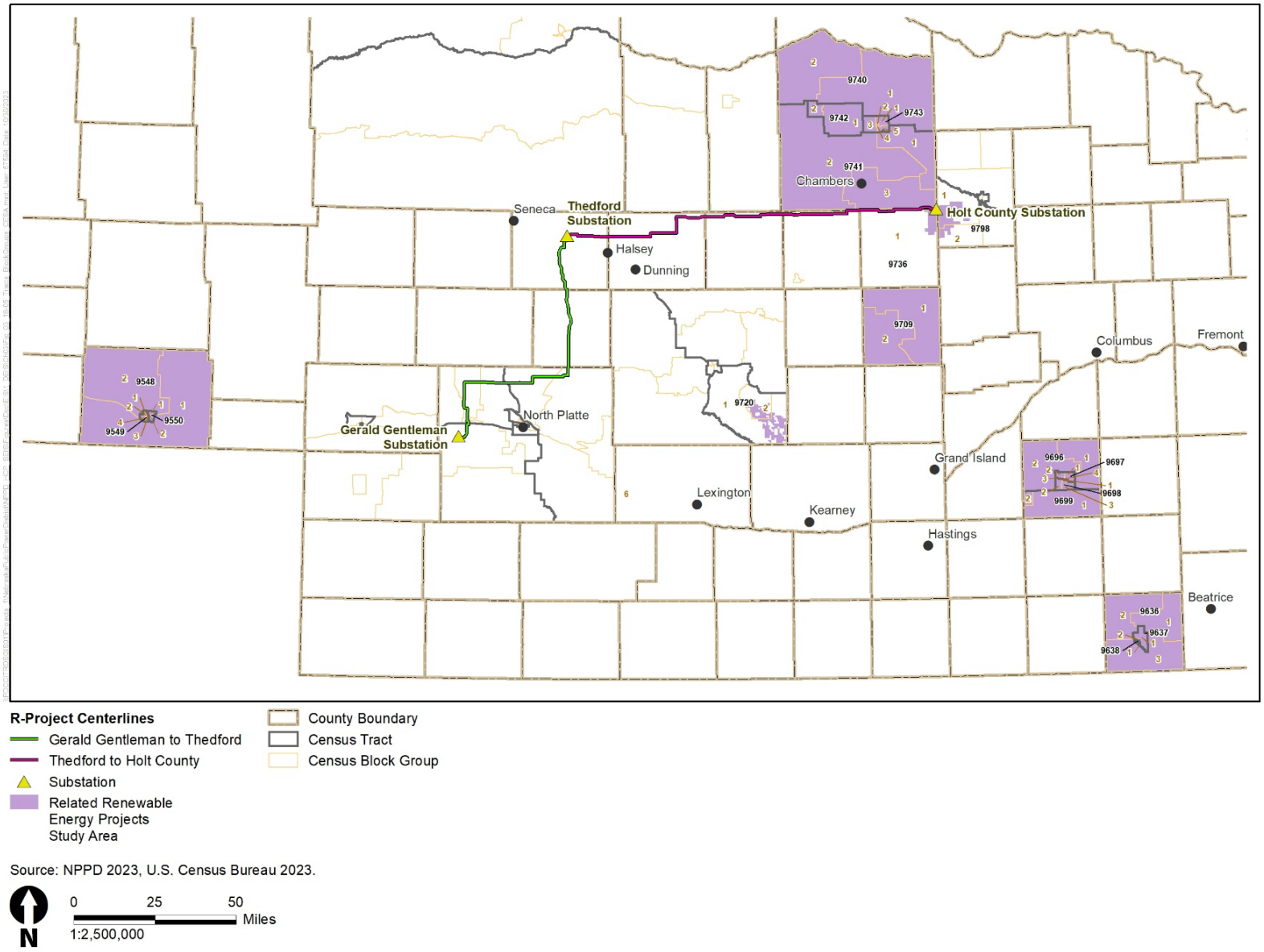


Figure 3.18-1. Study Areas for the Proposed Action and Alternative and the Related Renewable Energy Projects

Table 3.18-1. Minority Environmental Justice Populations in the Proposed Action and Alternatives Study Area

County	Census Tract	Block Group	Total Population	Total Minority Population	Total Minority %
Loup	972800	1	665	95	14.3%
Holt	974100	2	539	28	5.2%
Holt	974100	3	789	27	3.4%
Antelope	979800	1	535	38	7.1%
Lincoln	960600	2	1348	122	9.1%
Lincoln	959800	3	1403	132	9.4%
Lincoln	959800	2	1071	74	6.9%
Lincoln	959800	1	864	94	10.9%
Lincoln	959700	2	878	50	5.7%
Wheeler	973600	1	735	21	2.9%
Garfield	973200	1	751	12	1.6%
Blaine	972400	1	346	0	0.0%
Thomas	957100	1	562	39	6.9%
Lincoln	959700	1	917	45	4.9%
Logan	957500	1	865	97	11.2%
Nebraska	--	--	1,961,489	245,186	12.5%

Sources: USCB 2020

Presence of Environmental Justice Low-income Populations

Consistent with the FEIS, low-income populations are defined as census tracts where at least 20% of residents are below the poverty level. The study area for the proposed action and alternatives was analyzed against 2020 Census data to identify low-income populations at the census tract level. Results can be seen in Table 3.18-2 and Figure 3.18-3.

Table 3.18-2. Low-Income Environmental Justice Populations in the Proposed Action and Alternatives Study Area

County	Census Tract	Total Population	Individuals below Poverty	Individuals below Poverty (%)
Lincoln	959700	3401	176	5%
Lincoln	959800	3293	192	6%
Holt	974100	2548	192	8%
Logan	957500	865	74	9%
Blaine	972400	346	30	9%
Thomas	957100	562	41	7%
Lincoln	960600	3662	300	8%
Antelope	979800	2706	334	12%
Garfield	973200	1823	196	11%
Loup	972800	665	41	6%
Wheeler	973600	735	92	13%

Sources: USCB 2020

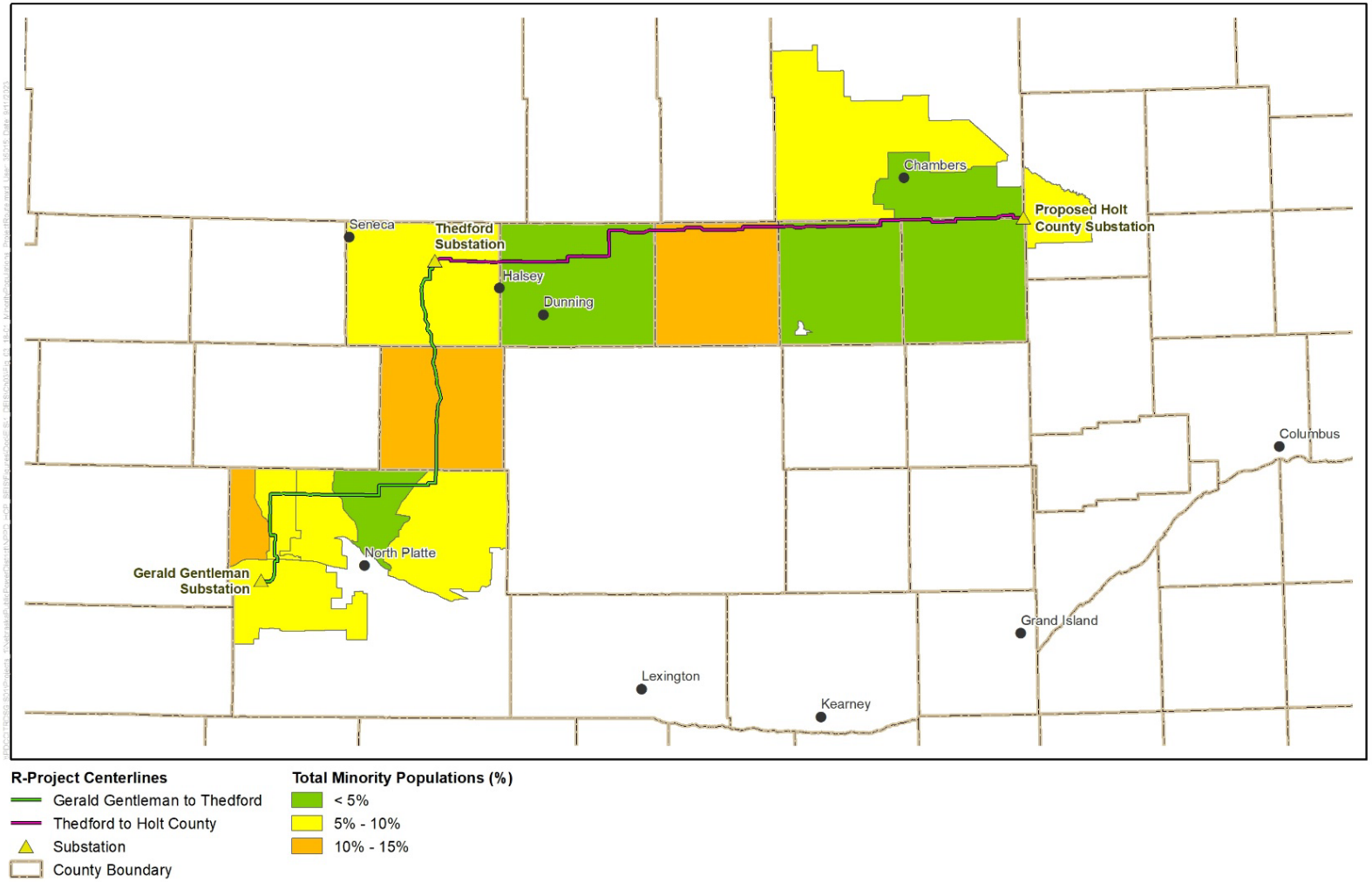


Figure 3.18-2. Minority Populations in the Proposed Action and Alternatives Study Area

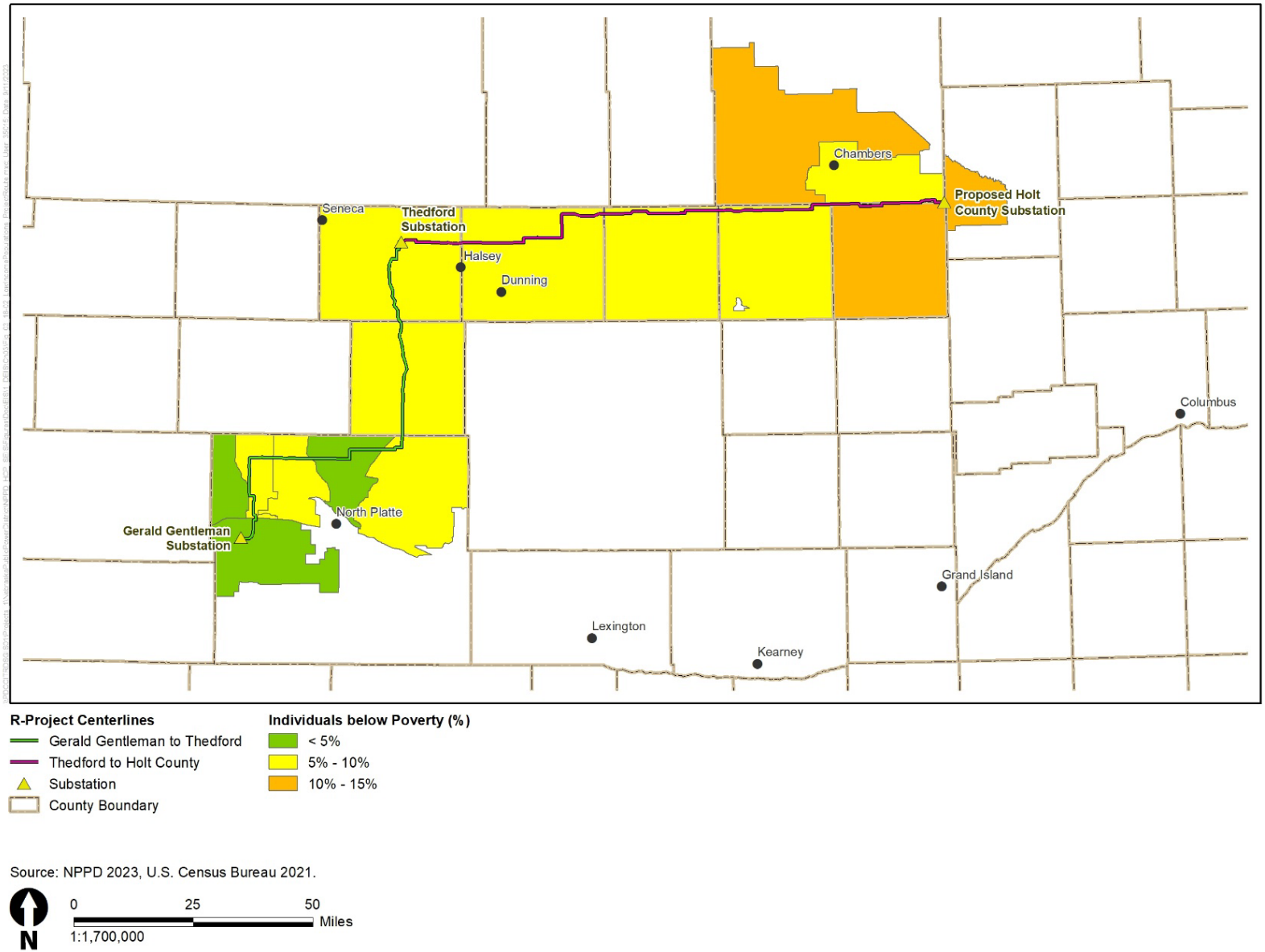


Figure 3.18-3. Low-Income Populations in the Proposed Action and Alternatives Study Area

Compared to the FEIS, the study area for the proposed action and alternatives encounters fewer low-income populations. Per the definition provided above, there are no environmental justice low-income populations in the study area.

3.18.1.2 Related Renewable Energy Projects

The study area for environmental justice effects of the related renewable energy projects includes the eight counties that contain the related renewable energy projects. The regional setting, as well as demographic and economic conditions in the study area, are described in SEIS Section 3.17, *Socioeconomics*. The study area is rural in character and sparsely populated. The area is dominated by agricultural land uses, primarily pastureland and rangeland with some cropland. Small populations are concentrated in incorporated villages and unincorporated communities located primarily along major transportation routes. All counties in the study area saw a decrease in population over the last decade, except for York County, which had a 3.4% increase (USCB 2020). Poverty rates have historically varied but exceed 10% for most counties in the study area. Like the entire state of Nebraska, the study area also has small minority populations.

The environmental justice assessment was completed at the census block level for minority populations and the census tract level for low-income populations (Figure 3.18-1). Census blocks and tracts were the smallest geographic areas with minority and poverty data, respectively, available in the study area. As the exact locations of most of the related renewable energy projects have not yet been determined, the study area was assessed at the census block and tract level.

Presence of Environmental Justice Minority Populations

CEQ (1997) and EPA (1998) guidance identifies a minority community in the area affected by a proposed action as either: 1) a minority population that exceeds 50% of the total population, or 2) a minority population that is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison. A minority population may consist of a group of individuals living in geographic proximity to one another. Further, a minority population exists if there is "more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997). For this analysis, the threshold for identifying an environmental justice minority area is if the minority population exceeds 50% of the total population in the evaluated area or the minority population percentage is more than 10% greater than the benchmark or reference region. The most recent data available are from the 2020 Decennial Census (USCB 2020). Results can be seen in Table 3.18-3 and Figure 3.18-4.

As noted above, the area of analysis for the environmental justice assessment of minority populations includes all the census blocks in the study area counties. The state of Nebraska was used as the reference area to identify census blocks with minority populations. None of the census blocks had a minority percentage over 50%. Of the 55 populated census blocks in the study area, 2 have more than a 10% higher percentage of minority residents than the state of Nebraska. These census blocks are in Cheyenne and York Counties (Table 3.18-3).

A minority population may also consist of a geographically dispersed set of individuals who experience common conditions of environmental effect. Such minority populations can include Tribal Nations that value, use, or depend on cultural, historical, or protected (e.g., treaty) resources that may be affected by a proposed action. While no Tribal Nation reservations are in the environmental justice population areas of analysis, there are several Tribal Nations in other parts of the state and in other nearby states that may have lived in the areas of analysis in the past.

Table 3.18-3. Minority Environmental Justice Populations in the Related Renewable Energy Projects Study Area

County	Project	Census Tract	Block Group	Total Population	Minority Population	% Minority	Minority Area (Y/N)
Antelope	Thunderhead Wind	974100	3	789	27	3.4%	N
Antelope	Thunderhead Wind	979800	1	535	38	7.1%	N
Antelope	Thunderhead Wind	979800	2	979	6	0.6%	N
Antelope	Thunderhead Wind	973600	1	735	21	2.9%	N
Cheyenne	N/A	954900	3	1070	191	17.9%	N
Cheyenne	N/A	954800	2	1879	184	9.8%	N
Cheyenne	N/A	954900	4	1385	147	10.6%	N
Cheyenne	N/A	954800	1	1183	47	4.0%	N
Cheyenne	N/A	955000	1	1355	191	14.1%	N
Cheyenne	**N/A**	**954900**	**1**	**590**	**210**	**35.6%**	**Y**
Cheyenne	N/A	954900	2	694	4	0.6%	N
Cheyenne	N/A	955000	2	1419	169	11.9%	N
Custer	Prairie Hills Wind	972000	1	607	17	2.8%	N
Custer	Prairie Hills Wind	972000	2	781	88	11.3%	N
Greeley	N/A	973600	1	735	21	2.9%	N
Greeley	N/A	970900	2	1082	47	4.3%	N
Greeley	N/A	970900	1	1137	44	3.9%	N
Holt	N/A	974300	2	1078	57	5.3%	N
Holt	N/A	974300	4	942	187	19.9%	N
Holt	N/A	974200	1	1025	62	6.0%	N
Holt	N/A	974000	1	559	52	9.3%	N
Holt	N/A	974200	2	966	56	5.8%	N
Holt	N/A	974100	2	539	28	5.2%	N
Holt	N/A	974000	2	982	31	3.2%	N
Holt	N/A	974100	1	1222	102	8.3%	N
Holt	N/A	979600	3	1055	26	2.5%	N
Holt	N/A	979600	1	480	1	0.2%	N
Holt	N/A	974300	1	959	57	5.9%	N
Holt	N/A	974300	3	549	62	11.3%	N
Holt	N/A	974300	5	565	12	2.1%	N

County	Project	Census Tract	Block Group	Total Population	Minority Population	% Minority	Minority Area (Y/N)
Holt	Thunderhead Wind	974100	3	789	27	3.4%	N
Holt	Thunderhead Wind	979800	1	535	38	7.1%	N
Holt	Thunderhead Wind	973600	1	735	21	2.9%	N
Jefferson	N/A	963700	2	1440	208	14.4%	N
Jefferson	N/A	963600	2	484	0	0.0%	N
Jefferson	N/A	963700	1	1527	161	10.5%	N
Jefferson	N/A	963800	1	1123	100	8.9%	N
Jefferson	Big Blue Nebraska	963600	1	1377	63	4.6%	N
Jefferson	Big Blue Nebraska	963600	3	1262	12	1.0%	N
Wheeler	Thunderhead Wind	979800	1	535	38	7.1%	N
Wheeler	Thunderhead Wind	979800	2	979	6	0.6%	N
Wheeler	Thunderhead Wind	973600	1	735	21	2.9%	N
Wheeler	Thunderhead Wind	974100	3	789	27	3.4%	N
York	N/A	969700	4	1355	108	8.0%	N
York	N/A	969800	1	757	136	18.0%	N
York	**N/A**	**969800**	**2**	**1965**	**460**	**23.4%**	**Y**
York	N/A	969800	3	1964	150	7.6%	N
York	N/A	969900	2	1023	117	11.4%	N
York	N/A	969700	2	906	59	6.5%	N
York	N/A	969700	1	1497	45	3.0%	N
York	N/A	969600	1	1427	68	4.8%	N
York	N/A	969700	3	543	16	2.9%	N
York	N/A	969900	1	1459	45	3.1%	N
York	N/A	969600	2	1268	180	14.2%	N
Nebraska	**N/A**	**N/A**	**N/A**	**1,961,489**	**245,186**	**12.50%**	**N/A**

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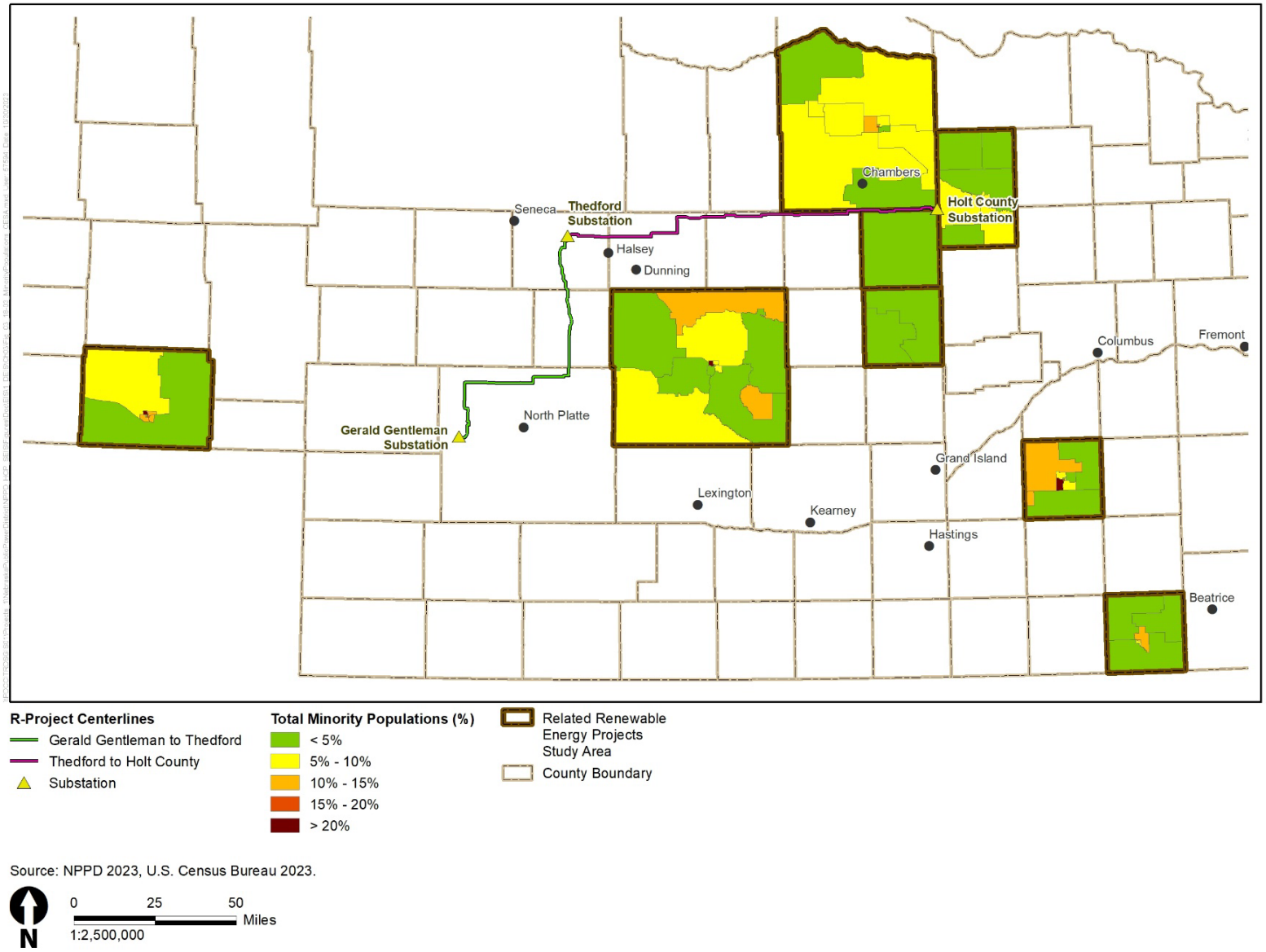

Figure 3.18-4. Minority Populations in the Related Renewable Energy Projects Study Area

Presence of Environmental Justice Low-income Populations

CEQ (1997) and EPA (1998) guidance indicate that low-income populations should be identified based on the annual statistical poverty thresholds established by U.S. Census Bureau (USCB). Like minority populations, low-income populations may consist of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals who would be similarly affected by a proposed action or program. USCB defines a poverty area as a census tract or other area where at least 20% of residents are below the poverty level (USCB 2014). This threshold is used to identify low-income populations for this analysis. The study area was analyzed against the 2020 Decennial Census data to identify low-income areas at the census tract level (Table 3.18-4 and Figure 3.18-5). Only 1 of the 25 census tracts (4%) exceeded the 20% threshold for identifying a low-income population: Census tract 963800 in Jefferson County at 31.2%.

Table 3.18-4. Low-Income Environmental Justice Populations in the Related Renewable Energy Projects Study Area

County	Project	Census Tract	Total Population	Individuals below Poverty	Individuals below Poverty (%)	Low-Income Area (Y/N)
Antelope	Thunderhead Wind	974100	2548	192	7.5%	N
Antelope	Thunderhead Wind	979800	2706	334	12.3%	N
Antelope	Thunderhead Wind	973600	735	92	12.5%	N
Cheyenne	N/A	955000	2692	359	13.3%	N
Cheyenne	N/A	954900	3689	358	9.7%	N
Cheyenne	N/A	954800	3048	375	12.3%	N
Custer	Prairie Hills Wind	972000	1383	84	6.1%	N
Greeley	N/A	970900	2188	296	13.5%	N
Greeley	N/A	973600	735	92	12.5%	N
Holt	N/A	974300	4031	355	8.8%	N
Holt	N/A	974000	1510	157	10.4%	N
Holt	N/A	974200	1955	162	8.3%	N
Holt	N/A	979600	1923	232	12.1%	N
Holt	Thunderhead Wind	974100	2548	192	7.5%	N
Holt	Thunderhead Wind	979800	2706	334	12.3%	N
Holt	Thunderhead Wind	973600	735	92	12.5%	N
Jefferson	N/A	963700	2885	231	8.0%	N
Jefferson	**N/A**	**963800**	**1107**	**345**	**31.2%**	**Y**
Jefferson	Big Blue Nebraska	963600	3077	177	5.8%	N
Wheeler	Thunderhead Wind	979800	2706	334	12.3%	N
Wheeler	Thunderhead Wind	973600	735	92	12.5%	N
Wheeler	Thunderhead Wind	974100	2548	192	7.5%	N
York	N/A	969600	2675	182	6.8%	N
York	N/A	969700	3869	295	7.6%	N
York	N/A	969800	4250	380	8.9%	N

Sources: USCB 2020

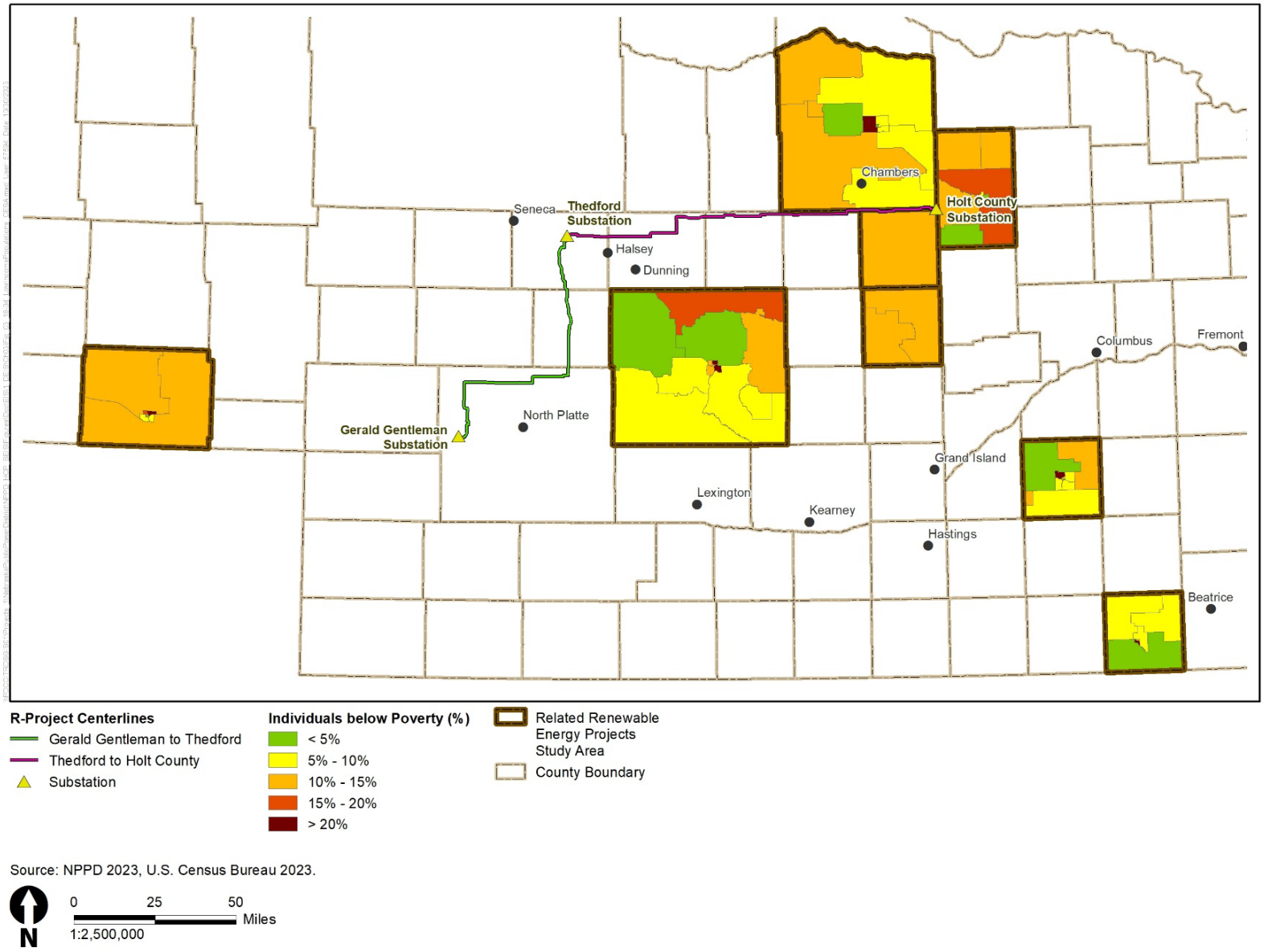

Figure 3.18-5. Low-Income Populations in the Related Renewable Energy Projects Study Area

3.18.2 Environmental Consequences

3.18.2.1 Proposed Action and Alternatives

No Action Alternative

Effects of the no action alternative on environmental justice would be the same as presented in FEIS Section 3.18.2.1, *No-action Alternative*, and are incorporated into this SEIS by reference.

Proposed Action

The types and intensity of effects of the proposed action on environmental justice would be the same as presented in FEIS Section 3.18.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, for the FEIS proposed action and are incorporated into this SEIS by reference, with the following differences. As stated in 3.18.1.1, *Presence of Minority Environmental Justice Populations*, no environmental justice minority or low-income areas are present within 0.5 mile of the proposed transmission line or substations. Additionally, no disproportionate and adverse impacts on minority or low-income communities would result from effects analyzed in other resource topics. Therefore, the intensity of effects would be the same as described for the FEIS proposed action (no effect or low intensity).

Alternative A (FEIS Proposed Action)

The effects of Alternative A on environmental justice would be the same as presented in FEIS Section 3.17.2.2, *Alternative A: Tubular Steel Monopole and Steel Lattice Tower Structures*, and are incorporated into this SEIS by reference.

Alternative B (Steel Monopole Only, Proposed Action Route)

The types and intensity of effects of Alternative B on environmental justice would be the same as presented in FEIS Section 3.17.2.3, *Alternative B: Tubular Steel Monopole Structures Only*, and are incorporated into this SEIS by reference.

3.18.2.2 Related Renewable Energy Projects

Minority populations were identified in 2 of the 55 census blocks in the related renewable energy projects study area, and a low-income population was identified in 1 of the 25 census tracts in the study area. Because potential environmental justice populations are present in the study area, it is necessary to: 1) identify any potential adverse impacts of the projects across all the resource topics; and 2) examine the spatial distribution of any impact areas to determine whether these impacts are likely to fall disproportionately on the minority and low-income populations. There are potential adverse impacts identified in some of the resource topic sections of this SEIS, ranging from short to long term and low to high intensity. Because all residents in the study area would experience these effects similarly, they are not expected to fall disproportionately on environmental justice populations.

Chapter 4
Cumulative Effects

When the FEIS was published, CEQ regulations required an analysis of cumulative impacts. FEIS Chapter 4, *Cumulative Impacts*, included this analysis. Since then, the revised CEQ regulations that became effective in 2020 removed all requirements relating to cumulative impacts. However, the current CEQ regulations, published in May 2022, reinstated the requirement, and referred to it as "cumulative effects" rather than "cumulative impacts." Therefore, the title of the chapter and terminology used herein have been revised to reflect the current CEQ regulations.

4.1 Methodology

The cumulative effects methodology is the same as described in FEIS Section 4.1, *Methodology*, and is incorporated by reference in this SEIS. Although the current CEQ regulations include a new definition of cumulative effects (40 CFR 1508.1(g)(3)), this change does not result in differences in the cumulative effects methodology, the general baseline trends, the reasonably foreseeable future actions, or the analyses and conclusions. The current definition of cumulative effects is as follows:

> "Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time."

4.2 General Baseline Trends

The cumulative effects general baseline trends are the same as those described in FEIS Section 4.2, *General Baseline Trends*, and are incorporated by reference in this SEIS, with minor exceptions described in this section.

Although the details of some general trends have changed since the publication of the FEIS, the general trends are the same. For example, specific population numbers have changed but the population trends have not. Additionally, some of the details of specific past and present activities identified in FEIS Table 4-2 have changed since the publication of the FEIS, but the types of activities and their description have not changed. For example, new electrical utility and wind power projects have become operational in the study area since the publication of the FEIS, but the general description of the types of activities and facilities associated with such projects are the same.

4.3 Reasonably Foreseeable Future Actions

FEIS Section 4.3, *Reasonably Foreseeable Future Actions*, is incorporated by reference in this SEIS, with notable changes or differences described in this section.

As noted in the introduction to this chapter, the CEQ regulations have been revised since publication of the FEIS. Although the definition of "reasonably foreseeable" was added to the current version of

the CEQ regulations per 40 CFR 1508.1(aa)[1], this change does not result in any difference in the identification of reasonably foreseeable future actions for this SEIS.

FEIS Section 4.3 identified future renewable energy projects in the context of potential cumulative effects. This section is incorporated by reference in this SEIS, with the exception of the Thunderhead Wind Energy Center (Thunderhead). As described in SEIS Section 3.1, since the FEIS was published, Thunderhead was constructed in Antelope, Holt, and Wheeler counties. Therefore, it is no longer considered a future project as characterized in FEIS Section 4.3. Instead, it is considered in this SEIS as a present project that has been constructed and is currently in operation; therefore, the existing operations of 195 MW generation from Thunderhead are included in the scope of the past and present activities described in SEIS Section 4.2, above. Increased generation from Thunderhead up to 300 MW due to the R-Project are included in this SEIS as an indirect effect (see SEIS Section 3.1, *Introduction*). Details about this project can be found in this SEIS Appendix E, *NPPD Summary of Thunderhead Wind Energy Center Operation*.

As described in SEIS Section 3.1, the Service has identified related renewable energy projects that are considered related to the R-Project. SEIS Section 3.1 describes these projects, and the potential impacts of these future related renewable energy projects are analyzed in the SEIS Chapter 3 resource topic sections.

Additional future renewable energy projects that have not yet been initiated yet could occur over the life of the R-Project in the cumulative impact study area. Therefore, the general future wind energy development as a trend or type of action (as described in FEIS Table 4-2) is incorporated by reference into this SEIS.

4.4 Cumulative Effects Analysis

FEIS Section 4.4, *Cumulative Impacts Analysis*, is incorporated by reference in this SEIS. The cumulative effects and their intensity levels would be the same as presented in FEIS and any changes described above in SEIS Sections 4.1 through 4.3 would not result in discernable or substantive changes to the cumulative effects analyses and conclusions. Although the SEIS considers related renewable energy projects an indirect effect of the proposed action and alternatives, when combined with other past, present, and reasonably foreseeable future actions, the cumulative effects and their conclusions would still be the same as described in the FEIS.

4.5 Summary of Cumulative Effects under the Proposed Action

FEIS Section 4.5, *Summary of Cumulative Effects under the Preferred Alternative (Alternative A)*, is incorporated by reference in this SEIS and remains applicable to the current proposed action. The cumulative effects and their intensity levels would be the same as presented in FEIS.

[1] *Reasonably foreseeable* means sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision.

4.6 Comparison of Cumulative Effects under the Proposed Action and Alternative A and B

FEIS Section 4.6, *Comparison of Cumulative Effects under the Preferred Alternative (Alternative A) and Other Action Alternative (Alternative B)*, is incorporated by reference in this SEIS. Although the SEIS proposed action and alternatives are slightly modified from the FEIS, the cumulative effects conclusions would be the same as presented in FEIS: the cumulative effects analysis and outcomes for each resource category under SEIS Alternative B would be essentially identical to the SEIS Alternative A.

Chapter 5
Other Analyses Required by NEPA

Chapter 5 of the FEIS was titled *Comparison of Alternatives* and included four subsections, two of which have not been incorporated by reference into this SEIS for the following reasons.

- FEIS Section 5.1, *Comparative Impacts of Alternatives:* After the FEIS was published, the CEQ Regulations were revised in 2020 and again in 2022. The current version of the CEQ Regulations includes new and revised language about what is required in the Environmental Consequences section of an EIS, including the comparison of impacts for the proposed action and alternatives (40 CFR 1502.16). Due to this change in the CEQ Regulations, the impact comparisons are made throughout the analysis in Chapter 3 of the SEIS and a separate section is no longer necessary in the SEIS.
- FEIS Section 5.2, *Selection of Preferred Alternative*: CEQ Regulations require agencies to identify the preferred alternative in the Draft EIS if one exists, and in the Final EIS unless another law prohibits it. As stated in SEIS Section 2.4, *Proposed Action: Tubular Steel Monopole and Steel Lattice Tower Structures (Current R-Project and Revised HCP; Preferred Alternative)*, the Service's preferred alternative is the Proposed Action, which is the current R-Project and Revised HCP. Therefore, this section is not necessary in the SEIS.

This chapter of the SEIS has a new title to reflect the revised contents.

5.1 Irreversible and Irretrievable Commitment of Resources

FEIS Section 5.3, *Irreversible and Irretrievable Commitment of Resources*, is incorporated by reference in this SEIS, with minor changes described below.

As noted above, the CEQ Regulations were revised after publication of the FEIS. Although there is a revised citation and definition of irreversible and irretrievable resources per current CEQ regulations, this revision does not result in any substantive changes between the FEIS and SEIS. The revised CEQ Regulation text is as follows.

> "Any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented (40 CFR 1502.16(a)(4))"

Although the acreages of vegetation, wetlands, and agricultural land affected by the proposed action and alternatives vary slightly from the FEIS, the same types of commitments of resources would result from the proposed action and alternatives analyzed in the SEIS. These changes in acreages would not result in discernable changes to the analysis and conclusions related to irreversible or irretrievable commitment of resources. Additionally, there would be similar types of commitments of resources (e.g., loss of vegetation, wetlands, and agricultural land use) resulting from the related renewable energy projects described in SEIS Section 3.1, *Introduction,* and analyzed in the SEIS Chapter 3 resource topic sections. Because the details of these projects are not yet known, acreages cannot be quantified.

5.2 Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

FEIS Section 5.4, *Relationship between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity*, is incorporated by reference in this SEIS, with minor changes described below.

As noted above, the CEQ Regulations were revised after the publication of the FEIS. Although there is a revised citation in the current CEQ regulations 40 CFR 1502.16(a)(3), the definition remains the same:

> "The relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity."

As described in the FEIS and throughout SEIS Chapter 3, construction of the proposed action would have short-term impacts on environmental resources associated with construction of the proposed R-Project transmission line. The proposed action would have long-term impacts from the permanent footprint of the transmission line and disturbance required for maintenance of the transmission line. As discussed in SEIS Chapter 3, while the acreages of disturbance vary slightly from those presented in the FEIS, these changes in acreages would not result in discernable changes to the analysis and conclusions related to short-term uses of man's environment. The area of permanent disturbance required for the proposed action and action alternatives would be unlikely to permanently affect regional natural resources to a significant degree. Therefore, the conclusions of FEIS Section 5.4 are applicable to the proposed action and action alternatives analyzed in detail in this SEIS, and that section is incorporated by reference into this SEIS.

There would also be short-term impacts associated with the construction of related renewable energy projects and long-term impacts associated with the permanent footprints of these projects. As described above, because the details of these projects are not yet known, acreages of impact cannot be quantified; however, as described for the proposed action and alternatives, the area of permanent disturbance required for the related renewable energy projects would be unlikely to permanently affect regional natural resources to a significant degree.

Chapter 6
Regulatory and Permitting Requirements

The SEIS incorporates by reference the contents of FEIS Chapter 6, *Regulatory and Permit Requirements* with certain updates noted below. NPPD (the applicant) would comply with any applicable current regulatory and permit requirements, including changes or updates that have occurred between publication of the FEIS and preparation of the SEIS. It should be noted that the regulatory requirements in FEIS Chapter 6, incorporated by reference in this chapter, only apply to the proposed action and alternatives, and do not apply to the related renewable energy projects. It is assumed that the developers of the related renewable energy projects (which are not NPPD) would comply with any applicable current regulatory requirements and would obtain the appropriate permits and approvals.

FEIS Section 6.1, *Federal Endangered Species Act,* and Section 6.2, *Section 10(a)(1)(B) Process—Habitat Conservation Plan Requirements and Guidelines*, summarize ESA requirements for preparation of HCPs. Since FEIS publication, the Service proposed revisions to Section 10 of the ESA, which governs the issuance of incidental take permits. The goal of these revisions is to make the use of these permits clearer, extend the Services' authority to issue permits for non-listed species separately from listed ones, simplify the requirements for enhancement of survival permits, and incorporate parts of existing policies into the regulations to reduce uncertainty. The proposed revisions also include technical and administrative changes intended to reduce the time and costs involved in the application process, with the expectation that these improvements will encourage more individuals and companies to participate in these voluntary programs, resulting in increased conservation efforts overall. This Proposed Rule was published in the Federal Register on February 9, 2023 (88 FR 8380).

FEIS Section 6.3, *Other Regulatory Requirements and Permits*, describes state and federal regulatory and permit requirements for the proposed action. All requirements described in FEIS Table 6-1 remain applicable to the proposed action, as defined for this SEIS. However, approvals which NPPD had received at the time of FEIS publication may need to be updated to reflect the changes to the R-Project that have occurred since that time. NPPD would ensure that any new or modified applications and approvals are in place prior to beginning construction of the revised R-Project and implementation of the Revised HCP.

Chapter 7
Submitted Alternatives, Information, and Analyses

Since the publication of the FEIS, CEQ regulations were revised twice. Current CEQ regulations, published in May 2022, require "a summary that identifies all alternatives, information, and analyses submitted by state, tribal, and local governments and other public commenters during the scoping process for consideration by the lead and cooperating agencies" in developing the EIS (40 CFR 1502.17).

Comments received during scoping are summarized in Appendix A, *Scoping Summary*. The full contents of all scoping comments are available on Regulations.gov at https://www.regulations.gov/document/FWS-R6-ES-2014-0048-0202/comment.

In accordance with current CEQ regulations, the Service invites public comments on this summary of submitted alternatives, information, and analyses during the public review period of the Draft EIS.

Comments received during scoping included the following suggestions on **alternatives**.

- Consider alternative routes that do the following:
    - Reduce or avoid impacts on various resources (e.g., Nebraska Sandhills).
    - Use existing easements and already disturbed corridors (e.g., existing transmission line corridors, existing road corridors, etc.).
    - Use underground construction to reduce impacts on resources (e.g., birds, wetland habitats).
    - Avoid degrading and impacting the most sensitive portions of the Sandhills.
    - Avoid conservation easements, specifically the Horseshoe Bar Ranch conservation easement.
    - Avoid impeding additional views and use no new space.
    - Use ultraviolet light to mitigate avian collision impacts with the transmission line.
    - Include offsite habitat restoration for species (e.g., whooping crane).
    - Avoid or reduce adverse impacts on O'Fallon's Bluff, or the Sand Hill Ruts, or both.
- Consider alternatives outside of the approved NPPD routing corridor.
- Consider all reasonable routing alternatives inside the corridors the Board approved in 2014.
- Comments on the alternatives considered but dismissed in the FEIS included:
    - Suggestions to revisit alternative routes that were considered but dismissed in the FEIS.
    - Suggestions to consider in detail alternatives that NPPD stated are economically or technically infeasible.
    - Consider substantively different alternatives, rather than slightly different transmission line tower options (e.g., steel monopole versus lattice tower) with no meaningful distinctions among the action alternatives.

The following supplemental **information** (i.e., supplemental materials or references) was submitted during scoping for consideration by the lead and cooperating agencies in developing the EIS. These materials are available to review on regulations.gov at Docket ID FWS-R1-ES-2014-0048.

- Information submitted by landowner James Fleecs about potential historic-era resources present on a parcel that the proposed R-Project intersects.
- Information (including photographs) submitted by Amber Fleecs about the presence of migratory birds along the proposed R-Project route.
- Information submitted by the Lincoln County Historical Museum providing historical accounts of the O'Fallon's Bluff and Mormon Trail Ruts areas.
- Information submitted by Nebraska Land Trust, Inc. regarding the H-Bar Ranch conservation easement.
- Nebraska State Senator Tom Brewer's amicus curiae brief from the Oregon-California Trails Association vs. the Service court case regarding the proposed R-Project.
- Report submitted by Twyla Witt entitled "A Whitepaper Outlining the Need to Address Energy Development and Other Urgent Conservation Priorities for Nebraska's Sandhills."
- Information submitted by Audubon of Kansas regarding renewable energy priorities in Nebraska and the migration corridor of the whooping crane.

The following **analyses** were submitted during scoping for consideration by the lead and cooperating agencies in developing the SEIS. These materials are available to review on regulations.gov at Docket ID FWS-R1-ES-2014-0048.

- Report submitted by Eubanks and Associates entitled "Potential Effect of the Proposed R-Project Transmission Line on the Aransas/Wood Buffalo Whooping Crane Population," which included an analysis of estimated whooping crane collision rates from the R-Project.
- Report submitted by Eubanks and Associates entitled "Wind MW Interconnection Capacity for a Proposed Transmission Line in Nebraska – Redacted for CEII" which provides estimates of the amount of wind generation that the R-project would support.

Information received during the NHPA Section 106 and Government-to-Government Tribal Consultation process from Tribal Nations, History Nebraska, the Advisory Council on Historic Preservation, and other consulting parties was considered in the development of this Draft SEIS and is summarized in SEIS Section 3.10, *Cultural Resources*.

Chapter 8
List of Preparers

Name and Organization/Entity	Project Role and Qualification
Jeff Runge, FWS	Fish and Wildlife Biologist; MS, Biology; BS, Wildlife Biology; 27 years of experience
Angela Burgess, FWS	Fish and Wildlife Biologist; MS, Wildlife Biology; BS, Biology; 16 years of experience
Mark Porath, FWS	Project Leader; MS, Fisheries; BS, Biological Sciences; 26 years of experience
Matt Rabbe, FWS	Fish and Wildlife Biologist; BS, Wildlife Biology; 18 years of experience
Hova Woods, ICF	Project Director; MPA, Environmental Policy & Science; BS, Finance; 22 years of experience
Lucas Bare, ICF	Project Manager; MESM, Environmental Science and Management; BA, Biology; 15 years of experience
Lydia Dadd, ICF	Deputy Project Manager; BS, Environmental Studies; 4 years of experience
Brent Read, ICF	GIS; MS, Watershed Science; BS, Forestry, Minor Spatial Information Management Systems; 21 years of experience
Jason Thoene, ICF	GIS; MS, GIS; BA, Geology; 25 years of experience
Patrick Maley, ICF	Geology, Soils, Mineral Resources, and Paleontology Lead Author; MPA; BA, Humanities; 14 years of experience
Ellen Unsworth, ICF	Geology, Soils, Mineral Resources, and Paleontology Senior Reviewer; MS, Interdisciplinary Studies (Geology, Biology, and Technical Communication); BA, Geology; 23 years of experience
Stephanie Kane, ICF	Water Resources, Wetlands, Vegetation Lead Author; Wildlife and Special Status Species Senior Reviewer; MS, Wildlife Biology; BS, Zoology; 18 years of experience
Dale Ritenour, ICF	Wildlife and Special Status Species Lead Author; BS, Biology, emph. Ecology; 25 years of experience
Jennifer Stock, ICF	Aesthetics; BLA, Landscape Architecture; 24 years of experience
Sarah Banguilan, ICF	Cultural Resources Lead Author; MA, Anthropology; BA, Anthropology; 16 years of experience
Jessica Feldman, ICF	Cultural Resources Senior Reviewer; MA, Historic Preservation Planning; BA, History; 22 years of experience
Mikayla Brown, ICF	Cultural Resources Senior Reviewer; MA, Public History; BA, History; 5 years of experience
Scott Meyers, ICF	Recreation and Tourism, Transportation, Air Quality and Greenhouse Gases, Noise, Hazardous Materials and Hazardous Waste, Health and Safety Lead Author; BA, Political Science; 3 years of experience
Gray Jones, ICF	Land Use, Socioeconomics, Environmental Justice Lead Author; BA, Environmental Sociology; 6 years of experience
David Ernst, ICF	Air Quality and Greenhouse Gases Senior Reviewer; MCRP, Environmental Policy; BS, Engineering; BA, Ethics & Politics; 43 years of experience
Kristen Lundstrom, ICF	Editing; BA, English; 16 years of experience
Kait Schultz, ICF	Editing; BA, Interdisciplinary Studies; 7 years of experience
Anthony Ha, ICF	Publications; BA, English; 17 years of experience